PB-212 739

Effects of Air Pollution on Public Attitudes and Knowledge

Oregon State University

prepared for
Environmental Protection Agency

JUNE 1972

Distributed By:

NTIS

National Technical Information Service
U. S. DEPARTMENT OF COMMERCE
5285 Port Royal Road, Springfield Va. 22151

EPA-R5-72-007

PB 212 739

Effects of Air Pollution on Public Attitudes and Knowledge

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
U S Department of Commerce
Springfield VA 22151

Oregon State University
Corvallis
June 1972

ACKNOWLEDGMENTS

This publication is the final report of a three-year study which was conducted under the terms of contract number CPA 70-117, Air Pollution Control Office, Environmental Protection Agency. The research began May 23, 1969 and terminated June 30, 1972.

Many people have contributed to the completion of various phases of this work. Pamela Bodenroeder joined the project in September 1969 as assistant leader and has worked tirelessly on all phases of the study. Assisting her from time to time were Dorothy Bowers, Betty Lou Brooks, Diana Coulombe, Alice Doyle, Julia Fisher, Ann Ginn, Gay Greger, Alice Henderson, Linda Henderson, Kathleen Hulburt, Margaret Kent, Cheryl Miller, Kathleen O'Dwyer, Penny Schmidt, Lora Seleen, Gretchen Wagner, Debora Wahlquist and Nancy Young. Marian Richardson and Joyce Driscoll completed many of the arduous typing and other secretarial tasks.

The nature of the research problem interested professionals from different disciplines and the author greatly profited from an association with many who contributed to his understanding of the complexity and subtlety of air pollution processes and effects. A number of individuals at Oregon State University generously gave of their time to advise on the many technical aspects of this study. These were R. M. Alexander, Air and Water Resources Center; Richard Boubel, Mechanical Engineering; William G. Brown, Albert N. Halter and Herbert H. Stoevener, Agricultural Economics; Lyle Calvin and Norbert Hartmann, Statistics; David Chilcote, Farm Crops; and E. Wendell Hewson and Wesley Tufts, Atmospheric Sciences. As well, Richard E. Hatchard, Columbia-Willamette Air Pollution Authority; Michael D. Roach, Mid-Willamette Air Pollution Authority; and Thomas E. Waddell, Environmental Protection Agency, provided most useful professional help and advice.

BIBLIOGRAPHIC DATA SHEET	1. Report No. EPA-R5-72-007	2.	3. Recipient's Accession No. PB 212 739

4. Title and Subtitle
Effects of Air Pollution on Public Attitudes and Knowledge

5. Report Date
June 1972

6.

7. Author(s)
Robert G. Mason

8. Performing Organization Rept. No.

9. Performing Organization Name and Address
Oregon State University
Corvallis, Oregon

10. Project/Task/Work Unit No.

11. Contract/Grant No.
CPA 70-117

12. Sponsoring Organization Name and Address
ENVIRONMENTAL PROTECTION AGENCY
Air Pollution Control Office
Research Triangle Park, North Carolina 27711

13. Type of Report & Period Covered
Final

14.

15. Supplementary Notes

16. Abstracts

The report presents the results of testing a public information model in which attitudes toward and knowledge about air quality play a role. (1) First, the linkage between public attitudes and Government action is discussed. Research efforts tested a hypothesis concerning the relationship between mass media content and attitude change. (2) Second, environmental conditions which may have a bearing on variables in the model are considered. Three variables were considered to be mutually interdependent and were considered endogenous. These were: attitude toward air quality; mass media exposure to information about air quality; and level of air quality knowledge. Variables considered exogenous were: levels of interpersonal discussion; social influence; levels of formal and science education; and use of the environment for recreation purposes. (3) Finally, a theoretical model concerning the acquisition and processing of air quality information, by people, is formulated and tested.

17. Key Words and Document Analysis. 17a. Descriptors

Air Pollution
Tests
Information
Mass Media
Public Opinion
Attitudes
Mass Communication
Communities
Sociometrics
Emission

17b. Identifiers/Open-Ended Terms
Air Quality
Air Pollution Control
Communication Model

17c. COSATI Field/Group 13B

18. Availability Statement Unlimited	19. Security Class (This Report) UNCLASSIFIED	21. No. of Pages ~~149~~ 151
	20. Security Class (This Page UNCLASSIFIED	22. Price 6.00

FORM NTIS-35 (REV. 3-72)

THIS FORM MAY BE REPRODUCED

USCOMM-DC 14952-P72

EFFECTS OF AIR POLLUTION ON PUBLIC ATTITUDES AND KNOWLEDGE

Robert G. Mason

Professor of Sociology

Oregon State University

June 1972

CONTENTS

Acknowledgments i

Summary, Conclusions and Recommendations 1

Introduction 9

Theoretical Framework for Public Attitudes and Knowledge 10

Public Attitudes and Governmental Action
Environmental Quality as a Public Issue
Enforcement and Community Conflict
Attitudes and Definition of the Situation
Definition of Air Pollution Situations
An Air Quality Communication Model

Methods--Content Analysis and Attitude Change 29

Selection of Location and Time
Development of Operational Measures
Data for Hypothesis Testing
Analysis of Data

Results and Discussion--Content Analysis and Attitude Change 40

Results of the Content Analysis
Analysis of Visibility Observations
Analysis of Attitude Change Scores
Discussion of Results

Methods--Air Quality Communication Model 53

Development and Evaluation of Operational Measures
Execution of the Sample Survey
Analysis of Data

Results and Discussion--A Test of the Air Quality Communication Model . 67

Results of Accuracy of Air Pollution Perceptions
Empirical Test of the Communication Model
Empirical Test of the Reformulated Communication Model
Discussion of Results

Literature Cited 90

Appendix A: Review of Literature 95

Appendix B: Interview Schedules A and B 101

Appendix C: Frequency Curves of Clean Air Themes 122

Appendix D: Verbatim Responses of Individuals Holding Accurate or Inaccurate Visibility Perceptions 136

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The purpose of this research was twofold: First, a test was made of a hypothesis concerning the relationship between mass media content and attitude change. More specifically, the relationship stemmed from the hypothesis that perceived changes in air quality in a community are defined or redefined, in part, by the local mass media. As well, a definition or redefinition in the media is sufficient for people to change their attitudes toward the topic. Second, a test was made of a theoretical model concerning the communication of air quality information to the public. Specifically, the model stipulated that three variables were mutually interdependent and were considered endogenous. These variables were attitude toward air quality, mass media exposure to information about air quality and level of air quality knowledge. Variables considered exogenous were levels of interpersonal discussion, social influence, levels of formal and science education and use of the environment for recreation purposes.

An empirical test of the mass media content - attitude change hypothesis involved a content analysis of two daily newspapers, one each from two communities. A panel design was employed to measure attitude change of a random sample of residents in the two communities. These communities were selected on the basis of known changes in air quality levels during the late summer. The communities were Eugene and Salem, Oregon. Because of its location at the base of the Willamette Valley, Eugene has experienced poor natural ventilation whereas Salem, located in the mid-Willamette Valley, has had good natural ventilation. Therefore, a contrast in visibility would be expected to occur when there is air pollution in the Valley. Personal interviews (for measuring attitudes) were timed in 1970 and in early 1971 to take advantage of this known change in air quality. The source of air pollution was agricultural field burning and the measure of air quality employed was level of visibility. Visibility observations were completed during interviewing periods to determine if changes in visibility occurred as anticipated. The recording unit for the content analysis was the theme and the unit of analysis was the article. Fifteen themes were developed and pretested. A total of 3,054 newspaper articles from an 11-year period (1960-1970) was analyzed. Frequency of themes, type of article and source of pollution mentioned were the data employed for determining if definition or redefinition had occurred. Attitudes toward air quality were measured by interviewing a random sample of residents in each community twice, once when visibility was high and once when it was low. Adjusted attitude change scores were employed to determine if a change in air quality was associated with an observed change in attitude. Results of the panel interview indicated that observed changes in attitudes were produced primarily by errors of measurement associated with attitude change scores and not by changes in air quality. Air quality did, however, change in the anticipated directions, accorded to analysis of visibility observations.

Results of the mass media analysis suggested that the air quality situation in Eugene was defined in late 1966 or early 1967; in Salem, definition likely occurred in August 1969. An air pollution episode occurred in Eugene in August 1969. In response, the state governor banned field burning for one week and placed control of future burning in the hands of a state environmental control agency. This action may well have contributed to defining the situation for Salem and for the entire state as well. One can conclude that the findings are weak, but positive, support for the definitional hypothesis concerning the relationship between mass media content and attitude change.

An empirical test of the communication model involved a personal interview survey of a random sample of individuals in the two communities employed for testing the mass media - attitude change hypothesis - Eugene and Salem, Oregon. Operational measures of variables in the theoretical model were based on summated response scores of items asked in a standardized interview schedule. Items employed for each variable were extensively pretested in a third community and subjected to an item analysis. Reliability estimates were also calculated. The personal interview survey was completed in 1970 and in early 1971 within planned time limits. Completion rates were well within acceptable levels. Significance of variables in the model was tested by two-stage least squares.

Results of the test of the communication model showed an error of specification in the model. One exogenous variable, interpersonal discussion, should have been considered endogenous. A reformulated model was developed to include this consideration. A new exogenous variable, belief that air pollution was serious in the community, was postulated exogenous to level of attitude.[1/] It was also anticipated that different models may be operating for individuals who accurately or inaccurately perceived changes in visibility which had actually occurred. A test for pooling data of accurate and inaccurate subgroups disclosed that data could not be pooled for the two subgroups in Salem. The model was analyzed separately for each subgroup. For Eugene, the community with an air pollution episode in 1969, a confounding of the perception measure was discovered which precluded attempts to pool data on the basis of accuracy of perceptions. A relatively large number of respondents compared pollution levels of 1970 with those of 1969, rather than with the previous interviewing periods in the panel. The communication model was tested in three instances. One was for Eugene respondents. Another was for respondents who held inaccurate perceptions in Salem. A third was for respondents also in Salem who held accurate perceptions.

One can conclude that different models were functioning in each instance and suggest that each model may represent different stages of the same underlying communication process. Initially, when changes in air quality are not likely to impinge on the individual's consciousness, attitudes are

---

[1/] Data from the previous model were used to test the reformulated model. This test is less meaningful than if new data had been acquired since the equations were developed after data from the previous model had been examined. Such selection tends to capitalize on relationships which might be high because of sampling fluctuations. Thus, caution should be employed in viewing results of tests of the reformulated model.

formed primarily by interpersonal discussion and on relatively low levels of knowledge. Selectivity in mass media exposure and interpersonal discussion is likely to be operating. As well, knowledge levels are formed partly on this selective mass media exposure. Later, when changes in air quality do impinge on the individual's consciousness, a lack of sufficient information in the channels of communication is likely. Those with high knowledge levels are likely to seek out information from both local mass media and interpersonal sources. Selectivity in information exposure has been abandoned and attitudes are based primarily on increased levels of knowledge. Finally, after a continued period of exposure to deteriorated air quality, an interdependence has been established between mass media exposure and level of knowledge. A sufficiency of information is available in the local mass media and knowledgeable individuals seek out and use this information. Level of knowledge is an important basis for determining level of attitudes which, in turn, is a predictor for level of interpersonal discussion. Those who are involved in interpersonal discussion are also greater users of the mass media. The effects of changes in air quality appear to be subtle, cumulative but nonetheless real, when studied in terms of cumulation of knowledge and attitude formation. The channels of communication play different roles at each stage of the communication process. An understanding of these roles should enhance the efforts of those interested in speeding up the formation of positive attitudes and the level of knowledge of people toward this topic.

The effects of exogenous variables -- social influence, science education, use of the environment for recreation and belief that air pollution is a serious community problem -- occurred in their predicted direction for all models. One effect of exogenous variables noted was to determine the percent change of each exogenous variable on the percent change in attitudes. Results showed that the social influence variable would produce the greatest change in air quality attitudes for Eugene respondents and for Salem respondents who held accurate air pollution perceptions. In these instances a 1% change in social influence would change attitudes toward air quality by 10% in Eugene and by 7% in Salem. Effects of other exogenous variables were small. However, a change in use of the environment for recreation was by far the greatest producer of attitude change among Salem respondents who held inaccurate air pollution perceptions. A 1% change in use of the environment would produce a 16% change in attitudes. Efforts to sensitize people who hold inaccurate air pollution perceptions should include attempts to persuade them to use the environment more for recreation. This practice is likely to produce more positive attitudes toward air quality and, perhaps, a more accurate perception of visibility restrictions. It is concluded that it would be difficult to produce more favorable air quality attitudes among respondents holding accurate than among respondents holding inaccurate visibility perceptions. Social influence is considered a more difficult attribute to change than it is to persuade an individual to use the environment more for recreation.

Moreover, social influence and interpersonal discussion concerning air pollution play a role in attitude formation, primarily at the initial stage of the communication process when perceptions are not likely to be accurate. The importance of interpersonal discussion is likely to be reduced once knowledge levels and attitudes are well established and after perceptions concerning air quality become accurate. As well, the positive relationship between science education and knowledge, found at all stages of the communication process, suggests that a knowledge gap exists between the highly- and poorly-educated segments of the community. Over time, this gap likely will become larger, not smaller. Thus, any program to employ the mass media to reach large numbers of people with information concerning air pollution is likely to reach the already well-informed. These people will be the primary beneficiaries of such an effort. Finally, the belief that air pollution is serious -- based on the individual's experience living or working in the community -- appears to have a bearing on attitudes at all stages of the communication process. A pre-condition for the establishment of a successful air pollution control program is that the citizens of an airshed recognize the scope and magnitude of the problem. This pre-condition is satisfied when they perceive odors and loss of visibility, for example, for what they are and in terms which they believe are important to them.

It seems reasonable to set down four recommendations concerning the role of public attitudes and knowledge in air pollution control efforts:

1. Air quality goals and standards should be established on the basis of their social feasibility as well as their economic and technical feasibility.

The establishment of goals and standards is defined as the concentration of pollutants which the public believes it can accept without adversely affecting its health or welfare. Few will argue the relevancy of economic or technological criteria. But, it is argued here that public acceptance of air pollution goals and standards implies the existence of a social definition of air quality which merits consideration as well. This social definition includes the role of public attitudes and knowledge. It is not argued that air quality goals and standards should mirror existing public attitudes or knowledge of the time. Rather, public concerns should be considered in good faith prior to the establishment of goals and standards. In many instances the public hearing requirement for implementation of the Clean Air Act of 1970 may well be sufficient, or result in, the "good faith" requirement stipulated above. In other instances, it may well be that public concerns would be more adequately considered by alternative methods.

2. Emission control programs should be based, in part, on the existence of an informed and supportive public.

The technology associated with emission control programs is likely to become more, rather than less, complex. The public is likely to be exposed to a number of new ideas constantly and, if accepted, some of these new ideas may help while some may hinder the improvement of control programs. Professionals who administer emission control programs should be prepared to state their cases clearly and publicly and, if possible, to secure public support for the changes they wish to make and for those they wish to ignore. An informed public does not necessarily mean a supportive one; yet, it is difficult to imagine a supportive public that is totally uninformed or is misinformed. It is quite likely that young people entering the adult population are far more sophisticated in comprehension of the technical aspects of air pollution, for example, than older citizens. Greater sophistication of the young likely stems from more intensive formal science education and from greater attention to environmental matters in the mass media, particularly newspapers. This demographic implication should not be ignored by professionals in charge of emission control programs in their planning of information and education activities.

3. Air pollution control authorities should become skilled in the use of applied behavioral science research in carrying out their emission control programs.

An objective assessment of the strengths and weaknesses of emission control programs is considered a necessary condition for the subsequent improvement or for the survival of the program itself. Assume that a social definition, including public attitudes and knowledge, of control efforts is an important consideration. It follows that this definition should be studied, analyzed and interpreted to establish the reference points for coping with the public issues which are likely to develop over the implementation of future control programs. It is here that well-planned and professionally conducted objective assessments of public attitudes, for example, will have a bearing. Professionals who administer emission control programs, among others, should become familiar with the strengths and weaknesses of public opinion surveys, for example. These professionals should be able to determine what such surveys can do and cannot do and where they most effectively play a role in evaluating an emission control program. How effectively they are used depends on the insight, skill and judgment of individual administrators. As well, these administrators should have sufficient "back-up" expertise available to evaluate the results of public attitude surveys which may be profferred by some interest group. The quality of such surveys may render the results specious or genuine, for example.

4. Additional research should be conducted to provide a more complete understanding of human reactions and behavior toward air pollution situations and control efforts.

An example is the gathering of additional data to verify the formulation of the communication models developed in this study. Specifically, models should be viewed as stages of an underlying communication process which are embedded in a particular air pollution situation. The situation itself should be studied carefully prior to theory construction. The role of economic benefits and externalities of a pollutor as well as feasibility of controls should be considered not only for the specification of variables in the model but also for the selection of communities or situations employed for empirical tests. In addition, the ability of pollutants to impinge on the consciousness of individuals should be examined prior to theory construction for the same reasons. Finally, the model, or models, should be extended to other pollution situations where the role of economic benefits, externalities, feasibility of controls and ability of pollutants to impinge on the individual's consciousness are likely to differ. With sufficient research one may determine the generalizations required to explain some aspect of human behavior toward the phenomenon of environmental pollution.

INTRODUCTION

The role of public knowledge and attitudes in the administration of air pollution control policies and programs has received, at best, cursory attention among professionals in the air quality field. One of the few to recognize that these variables may indeed play a role is Schueneman [41][1], who has pointed out the contribution of an informed and active public to a successful emission control effort. The process of setting air quality standards and enforcing emission restrictions has often relegated the understanding of people to a residual priority. More often, attention is focused on the preparation of air quality criteria, goals and standards; on the development of emission goals and standards; on the stipulation of design standards; and, finally, on the establishment of measures of tests for pollutants, equipment and the ambient air.

Granted that the establishment of standards is important, is highly technical -- requiring a specialized competence -- it is assumed nevertheless that, to be effective, these standards must be accepted with a modicum of public understanding and support. Establishment of standards implies that the decisions and actions taken by government to conserve (or not to conserve) air quality are based on valid knowledge about people and involve a degree of judgment about human behavior.

This report presents the results of testing a public information model in which attitudes toward and knowledge about air quality play a role. In this report, first, the linkage between public attitudes and government action is discussed. Second, environmental conditions which may have a bearing on variables in the model are considered. Finally, a theoretical model concerning the acquisition and processing of air quality information, by people, is formulated and tested.

---

[1] Numbers in brackets correspond to literature citations, page 90.

THEORETICAL FRAMEWORK FOR PUBLIC ATTITUDES AND KNOWLEDGE

Public Attitudes and Governmental Action

It is perhaps axiomatic, as Key [23] has noted, that all governments must concern themselves with public opinion; that they do not maintain their authority without some willing acceptance and conformity from most of those whom they govern. He considers popular government a special type in which one base for authority is the seeking of popular opinion. Here, government gives weight to the opinions of its citizens in its decisions. Persons outside the governmental establishment have a right to be heard. The legitimation of the 'right to be heard' becomes an ethical, if not a moral assumption underlying popular government and is operationalized into consistent patterns of action by those who hold power. Thus, the linkage between public opinion and governmental action rests not in a mirroring of opinion and action but in the expectation that public preferences and mass interests are considered in good faith. It is also assumed that a two-way flow of communication is established between the individual and his government and from government to its citizenry for either party to obtain consent -- by conveying information or by persuasion itself.

Moreover, as it seeks to form opinions favoring its policies, American government enjoys no monopoly on information or access to persuasion. Competing policies are urged on the public by a variety of sponsors -- special interest groups, opposition political parties and competing centers of political and economic power, for example.

American government may be characterized as functioning within some vaguely defined limits of public opinion. This opinion is often unevenly distributed among people and its translation into support is often a matter of conjecture at best. Still, governmental decisions must be and are made, and the substance of action, in many instances, is related to the contours of opinions that bear on an issue. Obviously opinion, in the sense of a mass opinion, has no immediate bearing on many actions of government. These actions represent a fait accompli simply because no general public opinion about them exists. Actions on issues in which opinions are widely held are another matter, for it is here that government often hesitates to act until the weight of public opinion has been assessed. Even when it appears that a majority favors new policies, government is hesitant to adopt a new course of action on a major opinion-related issue. Information from reputable pollsters, for example, that a majority favors a change in policy is neither necessary nor sufficient to compel a political leader to change his position on the issue. Reactions of people to new governmental actions are often unpredictable and politicians understandably want to be sure that if they act they will avoid widespread public hostility. Moreover, the social and economic costs to those adversely affected by new actions may be sufficient to guarantee inaction or delay.

To be sure, the appearance of a crisis may, at times, sweep political leaders into some form of action. But the action is often inaction or delay until the nature of the crisis is fully assessed. At other times, political leaders act successfully on controversial matters with what appears to be marginal public support. The rule, however, seems to be that major governmental actions await development of predominantly favorable public opinion.

It is in this vein that one might profitably examine environmental quality as a public issue and attempt to extract some major variables that would be of interest for study.

Environmental Quality as a Public Issue

Public concern about the environment is not new, as any veteran conservationist will tell you. Environmental quality as a public issue has waxed and waned in America for more than 100 years. The issue has its historical roots as a challenge to the widespread exploitation of the wilderness for man's use. Nash [32] and Huth [20] have chronicled the adoption of a different relationship between man and nature by these environmentalists. The dominant view expressed at the time (and still current) was that it is man's right and duty to overcome nature for his own use; hence, emphasis was placed upon the creation and use of technology. Early environmentalists, on the other hand, organized a new ideology around the goal of preserving tracts of land in their natural state for the esthetic, scientific or spiritual values inherent in a wilderness preserve. The ideology implied restrictions and cessations of commercial expansion. Modern environmentalists have gone beyond the wilderness-saving goals of their forebears. A view has been established that, as a consequence of the power created by science and used by technology, the future of mankind in the modern world is in danger. The value of scientific progress, technological change and economic growth, for example, has been seriously questioned by Boulding [3] and Commoner [9], to name a few. It is the codification and documentation of these two lines of thought that have contributed to the current ideology of present-day ecologists.

Concurrent to the development of this new ideology has been the apparent swift rise of environmental quality as a public issue. One heard almost no mention of it five or six years ago in public forums. Today it ranks among the top two or three issues facing the nation, according to public opinion pollsters.[1/] This swift rise in public concern may stem from several sources. First, mass media attention concerning the environment may well have played a role in focusing the public's concern on this issue. One has only to count the number of environmentally-related titles in the Readers' Guide to Periodical Literature to note the striking increase in the number of these titles. Moreover, the number has increased positively each year, from 79 in 1950 to 228 in 1969. Admittedly, increased media attention does not guarantee increased

---

[1/] See The Roper Report [48] for an up-to-date summary of a national sample. Problems of environmental quality ranked second in a survey of issues confronting a random sample of Oregon residents. The survey was conducted in April 1972 by this author. Only problems concerning taxes and school financing ranked higher. Fifty-eight percent of the respondents surveyed mentioned environmental quality as one of the two or three most important problems facing the state today. Sixty-one percent mentioned taxes and school financing.

public concern. Yet, one sees convincing examples of mass media effects. Tichenor et al. [52] have noted the impact of the publication of Rachel Carson's Silent Spring [6] on the subsequent pesticide controversy in the early 1960's. Second, as Tichenor et al. [52], have noted, environmental quality "reflects ideals which have been taught directly, specifically and energetically in American schools in recent years". They assert that messages concerning the environment have become important non-controversial issues to young people. Compared to family life education, for example, environmental quality has become a modern "motherhood" issue and far safer for teachers to manage. Third has been the widespread activity of political leaders on environmental matters. While one may argue that political action is a reflection of public concern, the fact that political leaders have acted with relative swiftness in attempting to cope with environmental problems has, in itself, contributed to socially defining and legitimizing quality of the environment as an issue. The relative ease of passage of the Clean Air Acts in 1963, 1967 and 1970, for example, testifies to the support environmental quality has among both conservative and liberal political viewpoints. Increased mass media attention concerning political action about environmental matters tends to generate still further support. One finds politicians of both political parties vying for honors as guardians of environmental quality.

While the evidence seems clear that there is a public consensus concerning environmental quality at the present time, it is not at all clear that the public agrees what should be done. What apparently has been rejected is the recommendation of some neo-environmentalists who call for drastic changes in life styles, commensurate with a re-ordering of national priorities concerning the role of science, technology and economic growth in American society. The dominant belief, as reported by Tichenor et al. [52] for example, is that "technology got us into the environmental crisis and technology will get us out". The adoption of this belief in the technological ethic appears to be widespread and, to date, few seem to be willing to give up their automobiles, restrict their use of electricity or accept control measures which threaten their economic self-interest.

Enforcement and Community Conflict

In the short run there appears to be more support for maintaining economic security of a community -- even among those most knowledgeable concerning pollution matters -- than for the enforcement of pollution control measures which strike at the heart of economic self-interest. Support for pollution control measures which imply unemployment or other forms of economic hardship is the least within those communities directly threatened, according to Tichenor et al. [52] . In the long run, however, they noted that public support for pollution control measures may bear more on the perceived fairness of enforcement and on the relationship perceived between enforcement and the community's future than on mere economic self-interest.

In any event, Stern [46], among others, has recognized that alternatives to immediate adoption of restrictions are employed in cases where enforcement of air pollution emissions, for example, may produce social or political conflict. While these alternatives include the immediate adoption of air quality goals and standards, they provide for a time phasing of restrictions or limitations necessary to achieve a desired air quality level.

It may be profitable to distinguish a basis upon which conflict within or between communities may arise from either air pollution effects or from the enforcement of emission restrictions. Social conflict normally develops as an implication of air pollution externalities. Externalities arise from the inadequacies of the market or legal system to make the polluter bear the full costs of his pollutants; thus, these costs are imposed or are "externalized" on others without compensation. Social conflict, as defined by Coser [10], is "a struggle over values and claims to scarce status, power and resources in which the aims of the opponents are to neutralize, injure or eliminate their rivals". One can conceive of at least two situations where the externality concept has different social effects, assuming that the polluter plays a significant economic role in the community. One is where the community which receives much or all of the economic benefits of a polluter also receives most or all of his externalities. The other is where the community which receives none or few of the economic benefits of a polluter also receives most or all of his externalities. Assume, in the first instance, that pollution conditions are sufficiently severe to impinge on the public's consciousness. One would expect conflict about enforcement to occur within the community if it appeared that abatement would jeopardize the economic health of the community. The parties to the conflict, initially, likely would be among the community's elite. Higher knowledge and favorable attitudes toward environmental quality are associated with high educational levels, professional or semi-professional occupations and participation in community organizations. These people are more likely, compared to those low in these attributes, to initially perceive and assess the implications of a polluter in terms of the community's long-term welfare. Those who hold pro-environmental attitudes are also likely to hold pro-community attitudes and may see nothing inconsistent with holding both sets. It isn't until a situation arises in which these two attitudes interact or are brought into relation with one another that the inconsistency becomes apparent and a re-evaluation is set in motion. In the Tichenor study cited earlier, those interviewed responded to a set of proposed environmental measures that had a bearing on the economic welfare of a community. Support for the environment was most prevalent among the well-educated in all communities. Furthermore, it is among the elite that one would expect to find individuals who possess the skill to develop and propose workable alternatives to continued pollution, to obtain access to governmental enforcement machinery and, in general, to engage in a confrontation with a polluter and other community elites. Moreover, the chances are also good that in many non-metropolitan communities intense conflict over pollution abatement is not likely to break out or become public. For, as Coleman [8] has noted, participation in community organizations tends to cement the community by providing channels of communication, both among citizens and between citizens and the elite. These channels also serve as sources of influence when conflict threatens to break out. Individuals in these organizations hear both sides of the controversy in face-to-face contact and are subject to persuasive cross-pressures. Conflict is more likely to break out in communities where the communication and influence networks are not available or are not working. The evidence also suggests that the local mass media is likely to "manage" conflict by not reporting it. Olien, _et al._, [35], in a study of 88 Minnesota communities, found that the community press tends to support community institutions by ignoring the disruptive aspects of public life.

One would not expect the same behavior of people in a community which received none or few of the economic benefits of a polluter but received all or most of his externalities. Again, assume that pollution conditions are severe enough to impinge on the public's consciousness. One would expect conflict about enforcement to occur _between_ communities if it appears that abatement would jeopardize the economic health of the polluting community. The conflict is carried to some higher political institution for resolution, such as a regional or state environmental control agency. One would also expect to find a high level of consensus within each community concerning the issue. As well, the local mass media in each community would be expected to manage the conflict by reporting the issue fully, emphasizing each community's side of the controversy respectively.

In both of these instances it is argued that social conflict may serve the interest of environmental quality. Conflict is viewed as a method by which values concerning environmental quality are affirmed. In the long run society itself is likely to benefit from this form of conflict. As Coser [10] has noted, conflict is a process through which adjustment to new conditions can be brought about. It is through conflict behavior that norms are modified or created and the continuation of society is assured under changed conditions. A rigid social system -- one not permitting conflict -- will block adjustments and will tend to maximize the danger of catastrophic social breakdowns.

The externality concept, as used here, cannot be applied to predict forms of conflict for all air pollution situations. One can conceive of communities which produce pollutants that mix with emissions from other communities in the same airshed. Pollutants may or may not fall on communities in proportion to each one's contribution. An assessment of social effects of externalities is difficult at best. In this instance the community conflict model may not be appropriate. One would expect the advancement of an environmental ideology to become one basis of conflict rather than community self-interest _per se_.

Moreover, while the effects of externalities may be important in suggesting forms of community conflict, they are not likely to be as useful as an alternative and related concept for predicting forms of conflict resolution. This alternative concept is the use of economically and technically feasible controls for air pollution emissions.

At times there is considerable interest shown by a pollutor or an enforcer (_i. e._, governmental pollution enforcement agency) in reducing emission levels. But the technology is not always available to guarantee lower rates -- at least sufficiently low to reach desired air quality goals. The availability of economically and technically feasible emission control devices may well determine the level of emissions permitted. The level of control is considered a function of the technological effectiveness of control measures, of control cost and of damages averted by lowering pollution levels. Applying these elements, the decision rule advanced by some economists[1/] is to expand air pollution control so that the additional cost of one more increment of control is just equal to the value of the additional damage averted. The point where the total net benefits (total benefits minus total costs) is a maximum, defines the optimal allocation of resources to air pollution control. It is recognized that it is difficult to quantify all the benefits or to quantify some of them so they are commensurate with dollar values employed to measure costs. One can, however, conceive of at least three instances when the presence or absence of feasible

---

[1/] See, for example, the recent article by Downing [13].

emission control technology would have a bearing on the form of conflict resolution.

The first is when both the pollutor and enforcer agree that economically feasible emission technology is available. Once a pollutor is aware of available feasible technology he agrees to comply with control standards. It is a matter of establishing compliance schedules and testing and maintaining control equipment. The second instance is when the enforcer believes, but the pollutor disagrees, that feasible emission control devices are available. The disagreement arises because some of the pollution control benefits are "external" to the decision process of the pollutor. In this instance one alternative for resolution commonly employed is to use some aspect of the adversary process. Procedures of this process include informal and formal agreements, binding judicial decisions without use of rules of evidence or court tests where rules of evidence are employed. Decisions established through some adversary procedure do not necessarily rule out subsequent social conflicts, however. The ability of an enforcer to impose sanctions upon a polluter by successful court (or administrative) decision, for example, has the potential for considerable social upheaval as enforcers move to impose emission restrictions which threaten either the short- or long-run economic security of a community. Whether or not conflict breaks out may be more a function of the perceived fairness of enforcement and the effect of enforcement on the community's future than on mere economic well-being. The third instance is when both the polluter and enforcer agree that feasible controls are not available. In this instance one is likely to find, other than a crash program of research, attempts to modify the behavior of the public or the polluter to adjust to severe pollution conditions. One sees, for example, "smog alerts" employed in the Los Angeles and the New York - New Jersey metropolitan areas and attempts to "manage" field burning in Oregon's Willamette Valley. Such modifications of behavior are often viewed as a temporary solution, based on the assumption that technology will develop sufficient hardware to adequately control emissions. As with many temporary solutions, modified behavior patterns tend to become defined as the status quo until another environmental episode underscores their limitations, often triggering further social conflict.

The notion of level of technology focuses on the role of some enforcer as an agent for conflict resolution on the assumption that it is through him that the laws or authority of government and use of available technology are operationalized. Inadequacies of either the availability or application of law or technology are necessary (but not sufficient) to generate a pollution episode. An episode is defined as the occurrence of an event which threatens to produce an unusually large loss such as damage to human health, property or status, and in which the bureaucratic structure is unable to cope with or to control, with existing laws and technology. A pollution episode stems from the contamination of some aspect of the environment so it is unfit for intended use. One effect of a pollution episode is to compel a political leader to affirm one set of rival interests and values of competing groups. This may be operationalized by temporarily suspending or severely regulating the activities of a polluter, the public, or both.

The social effects of externalities and availability of economically and technically feasible controls may be summarized by examining their joint distribution in the following six-fold table:

Availability of economically and technically feasible emission controls	Pollution externalities occur within a polluting community	Pollution externalities occur outside a polluting community
1) Enforcer, polluter agree, feasible emission controls available.	Minimal social conflict; compliance.	Minimal social conflict; compliance.
2) Enforcer agrees, polluter disagrees, feasible emission controls available.	"Managed" social conflict within a community; adversary procedure employed.	Social conflict between communities public; adversary procedure employed.
3) Enforcer, polluter agree, feasible emission controls not available.	"Managed" social conflict within a community; behavior management employed.	Social conflict between communities public; behavior management employed.

One may well describe the type of social conflict and action concerning air pollution effects by knowing the nature of the pollution externalities and the availability of feasible emission controls. Suppose, for example, one wished to study the effects of social conflict concerning air pollution abatement. He would likely find these expressed in a situation where feasible controls are not available and where pollution externalities occur outside the polluting community. Suppose, on the other hand, one wished to study the effect of type of community power structure in resolving social conflicts brought about by air pollution abatement. He would likely examine communities whose pollution externalities occur within the community and where feasible emission controls are either not available or where the enforcer and polluter disagree over the feasibility of available controls.

Social conflicts over air pollution effects and controls can, in themselves, crystallize the attitudes of individuals and groups in affected communities. Positive or negative attitudes are formed (or changed) from the interaction between two or more groups over time. Norms, or direct guides to positive or negative action, are established as the end product of this interaction. Relations among individuals belonging to these groups must become standardized as norms toward other groups and toward situations before they are reflected as inter-group attitudes. The process of attitude formation or change concerning pollution effects thus appears relevant to any study involving an explanation of human behavior over this issue.

Attitudes and Definition of the Situation

It has frequently been asserted that a person's observed verbal or nonverbal behavior is determined by his psychological structuring of events.[1/] As well, this structuring is jointly determined by the interaction of both external and internal attributes. Examples of external attributes are aspects of objects or events in the environment and social influences such as interpersonal suggestions and group participation and pressures. Internal attributes include personal knowledge, interests, motives, set and socially-derived factors such as attitudes, beliefs, internalized norms and values.

[1/] See, for example Sherif and Sherif [42].

Presumably, if one had sufficient theory to tell how to combine the significant attributes in their proper relationship with one another and, knowing the scores of individuals on each attribute, one could then predict with a reasonably high level of certainty each individual's psychological structuring and his observable behavior toward some event.

Moreover, if one had sufficient theory to specify the effects of a change in external or internal attributes in terms of changes in psychological structuring, then one could again predict with reasonable certainty changes in each individual's observable behavior.

Individuals, however, may or may not be clearly conscious of their psychological structure. They are often unable to explain their behavior to anyone. To be sure, social scientists may be able, after reviewing interview protocols, for example, to reconstruct or infer models which explain an individual's behavior. Psychological structuring does not necessarily play a role as a conscious antecedent to the individual's behavior. It is a theoretical construct which mediates between external and internal attributes and observable behavior.

External and internal attributes do, however, often impinge on the consciousness of many and the resultant structuring is termed the individual's "definition of the situation". This term is derived from W. I. Thomas' [49] aphorism "if men define situations as real, they are real in their consequences". This has led workers to investigate how individuals develop common perspectives and communicate these to each other. The term implies no one-to-one correspondence between an objective event (or situation) and people's perceptions of that event--that something intervenes between events and people which makes possible a variety of interpretations to reality. The same event, for example, can have different meanings for different people and the degree of difference can be expressed as observable behavioral differences. As well, objective events contain common elements through time for different people (e.g., many aspects of driving a car along one smoggy freeway are the same as driving a car along another smoggy freeway).

People who enter objective events carry similar backgrounds and attitudes which make it possible for them to define events in similar ways. Uniqueness of events, while an aspect of any situation, cannot be ruled as a barrier for scientific study of them. What is required is specification of "something" which intervenes between events, or situations, and people.

Stebbins [45] considers the definition of the situation a "more or less conscious synthesis and personal interpretation of the interrelation of the set of predispositions and the elements of the subjective situation". Three concepts play roles in Stebbins' formulation: objective situation, subjective situation and action orientation. He defines an objective situation as the immediate social and physical surroundings and the current physiological state of the actor (i. e., individual). The subjective situation is those components of the objective situation which are seen by the actor to affect any one of his action orientations. The term "action orientation" refers to any purpose, trivial or important, which the actor has as he enters the objective situation, such as driving down a smoggy freeway. The point is that action orientations serve as guides to behavior as the individual enters the objective situation. Stebbins asserts that action orientations guide the selection of elements from the objective situation for the development of the subjective situation. Subjective situations are postulated to have time limits; action orientations play a crucial role in time calculations since situations exist as long as it takes the individual to manipulate them. Subjective situations, once identified, must be interpreted and given meaning in terms of the individual's background. This interpretation, as noted above, is the definition of the situation and its final formulation is affected by both predispositional and situational factors. Predispositional factors stem from the actor's past definitions of situations, from former and future plans of action, from past and present action orientations and from the actor's values and attitudes, among others. Chronologically, the definition of the situation immediately precedes the individual's behavior which has responded, in turn, to the subjective situation. A definition is completed only after a period of conscious reflection. Goal-directed behavior is delayed until the individual has defined the situation. Action unfolds commensurate with the definition. Stebbins allows for trial-and-error behavior during reflection. Goal-directed behavior, however, becomes possible only after meaning is established for the situation in terms of the action orientation. As well, he notes that definitions vary in amounts of reflection required; habitual and routine situations call for less reflection than the unusual, the relatively new or crisis situations. In any case, definition is a necessary condition to goal-directed behavior.

Empirical work supporting definitional processes has focused on the effect of defined situations as modifier of attitudes and the procedures actors employ in the definitional process. Gordon [15] considers the person's definition of the situation a modifier of attitudes toward certain objects. McHugh [27], using a laboratory setting, was able to demonstrate that different actors appear to follow similar procedures for constructing substantially different definitions.

It is recognized that explication of the definitional process has not led to widespread theoretical development and empirical testing. One is not likely at this stage to find sociologists making precise predictions which are capable of empirical verification or refutation. But the definitional formulation provides a view for examining phenomena capable of affecting large numbers of people simultaneously. As well, variables may be selected on the basis of definitional literature that are worthy of further study. It is in this vein that the definition of air pollution situations will be examined.

Definition of Air Pollution Situations

It can hardly be refuted that some aspect of air pollution -- loss of visibility, odors, perception of particulate matter, to name a few -- has not impinged on the consciousness of most Americans. Even before it became fashionable to express environmental concerns, air pollution was (and still is) defined by some as evidence of employment and economic activity. To others, air pollution represents an environmental insult of the worst sort threatening the survival of man and all other creatures living on this planet.

That multiple definitions are possible from the same (or nearly the same) objective pollution situation is supported by studies relating public concern, attitudes, beliefs and knowledge about air pollution levels, effects and controls. The work of Crowe [11], among others, is typical. Moreover, multiple definitions at one point in time may represent a redefinition for some -- a change in the components of meaning. One effect of a redefinition may well be a change in attitude, defined as a change in the positive or negative evaluative predisposition of an individual toward some aspect of air pollution. One way to examine the postulated association between definition of the situation and change (or no change) in attitude is to study inputs from the objective situation that may have a bearing on definition or redefinition. One such input is to study the mass media themes concerning air pollution which have been published in a community over a relatively long period of time. Themes, or assertions about some aspect of air quality, function in defining situations by providing descriptions of the present. Concerning themes, McHugh [27] asserts that "actors assume before the fact that a pattern of meaning will be discovered in the events they observe. They are future oriented, in that they take it for granted they will be able to make something of what is yet to occur. They are also past oriented, in that they take it for granted that what has already occurred will inform the future. Each of these orientations folds back as an actor's description of the present." One ingredient in defining the present is assumed to be the input of mass media content, as described by frequency and direction of themes from the objective situation. A rigorous content analysis should provide a basis for estimating definitional (or redefinitional) characteristics of air pollution situations for individuals in a community. Then if it appears that an air pollution situation has been defined or redefined on the basis of a mass media content analysis, one can test if attitudes toward air quality remain the same or are changed according to definitional predictions. If, for example, it appears that an air pollution situation is not redefined within a specified time range, then attitudes toward this phenomena should not change within the same time range.

The inferential leap from content analysis of mass media themes to attitude change of individuals is great, however. What should be specified as well is how inputs from the mass media are related to attitude level or change. If it is demonstrated empirically that a reciprocal causal link or links can be established between attitude level or change, mass media use and other endogenous variables, then one is on firmer ground for relating results of a mass media content analysis to an individual's change or lack of change in attitude. The formulation of such a communication model must be drawn from work outside the definitional literature, however, since the necessary statements capable of empirical tests are not available. Research concerning the communication of scientific information to the public is likely to prove more fruitful and some of this work will be examined next.

An Air Quality Communication Model

In a secondary analysis of science knowledge and attitude data from 27 sources, Tichenor [50] hypothesized that the communication process in which attitudes and mass media exposure play a role can be schematized as follows:

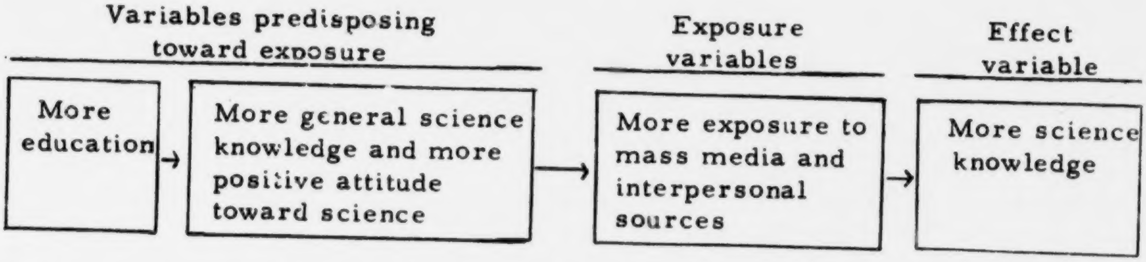

Variables predisposing toward exposure
Exposure variables
Effect variable
More education
More general science knowledge and more positive attitude toward science
More exposure to mass media and interpersonal sources
More science knowledge

Figure 1. A communication model for accumulation of science knowledge.

He stipulates that his predisposition variable toward exposure (those which occur prior to exposure) are represented by two variables. Level of education is designated as an antecedent variable, primarily because it occurs first in the time sequence. Formal education establishes an individual's level of general science knowledge as well as his positive or negative evaluation, or attitude, toward science. Exposure variables -- exposure to mass media and interpersonal sources -- represent complementary channels through which additional science knowledge flows. Acquisition of such additional knowledge represents the effects variable.

The sample size of his data base was large enough for him to partial out or control for the effects of a number of demographic, attitudinal and exposure variables in order to determine if postulated effects, such as a level of education, serve as an independent predictor of science knowledge. His central findings suggest that both the predisposition and exposure variables add to the predictive power of accounting for variation in science knowledge. His analysis, however, did not permit him to state precisely the direction of all the arrows (*i. e.*, the effects) in the above model. It is still not known if attitudes toward science lead a person to acquire more science knowledge through greater mass media exposure, or if these three variables represent an interdependent system. It is conceivable, as Hovland [19] has pointed out, that attitudes may predispose a person to acquire certain types of information but such information may also trigger a change in attitude which stimulates seeking of still more knowledge. In addition, it is also possible to reconceptualize the scheme so that the exposure and effects variables represent specific science items, such as mass media exposure to information and more knowledge about air quality. In fact, this is the nature of much of the data with which Tichenor was dealing. Predisposition variables included measures of level of education and other demographic characteristics, measures of general science knowledge and attitudes toward science. Measures of exposure and effects variables, however, often dealt with specific science fields, such as mental health, medicine, psychology, fluorine and tooth decay, smoking-cancer link, etc. Moreover, the list of variables in each class is not exhaustive and thus can be expanded to include others which conceivably underlie increased mass media exposure and science knowledge. With these considerations, the Tichenor model might be profitably reformulated to describe more precisely the relationship between an individual's attitudes toward air quality, his level of mass media exposure to air quality information and his level of knowledge about air quality.

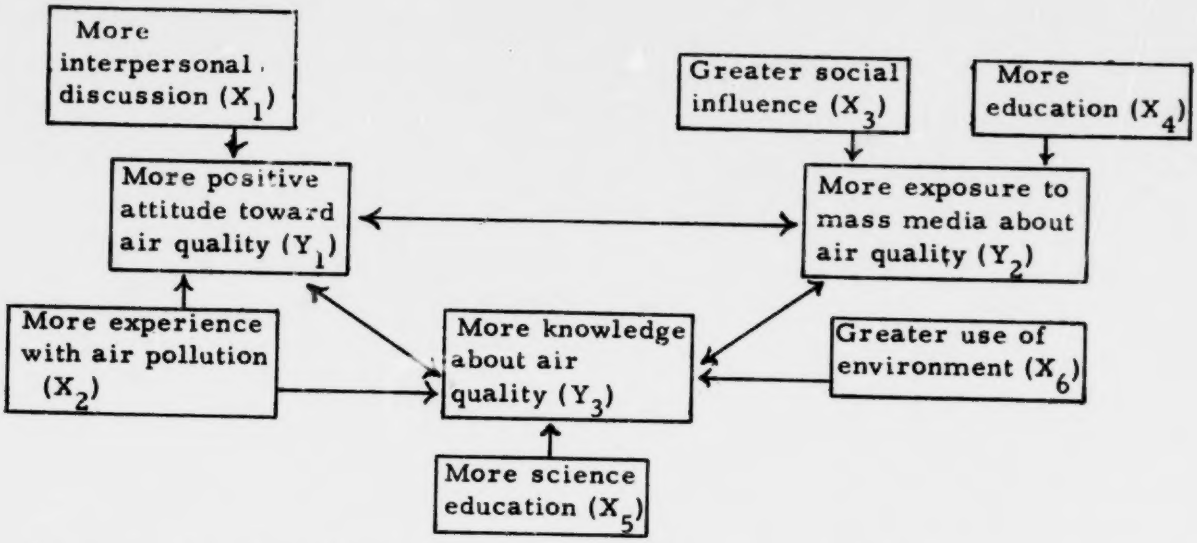

More interpersonal discussion (X_1)
Greater social influence (X_3)
More education (X_4)
More positive attitude toward air quality (Y_1)
More exposure to mass media about air quality (Y_2)
More experience with air pollution (X_2)
More knowledge about air quality (Y_3)
Greater use of environment (X_6)
More science education (X_5)

Figure 2. A reformulated model for accumulation of air quality information by the public.

The model shown in Figure 2 stipulates that three variables are mutually interdependent and are denoted as "Y" variables in the figure. These variables are: attitude toward air quality, mass media exposure to information about air quality and the level of knowledge about air quality. The interest here is not with a single independent-dependent relationship but rather with a system of relationships in which the "Y" variables are imbedded and which leads to a description of the interdependent relationships among these variables. With such a model, then, the existence of mutual interdependence among attitude, exposure and knowledge variables can be tested. Is, for example, knowledge dependent on attitude and exposure? Does such knowledge, in turn, affect attitude and exposure? The use of a set of simultaneous equations should provide an answer to these types of questions.

The other variables, denoted as "X's" in the model, are "outside" the system. They serve as important predictors and, as will be noted later in the section on methods, represent important operational considerations for analyzing the system empirically. Direction of arrows does not represent a causal relationship but only predictions that relationships exist.

The model can be described mathematically as a system of simultaneous equations:

$$Y_1 = \beta_{11}Y_2 + \beta_{12}Y_3 + \gamma_{11}X_1 + \gamma_{12}X_2 + e_1 \qquad (1)$$

$$Y_2 = \beta_{21}Y_1 + \beta_{22}Y_3 + \gamma_{21}X_3 + \gamma_{22}X_4 + e_2 \qquad (2)$$

$$Y_3 = \beta_{31}Y_1 + \beta_{32}Y_2 + \gamma_{31}X_2 + \gamma_{32}X_5 + \gamma_{33}X_6 + e_3 \qquad (3)$$

where

Y_i is the observed value for the appropriate endogenous variable in the system,

β_{ij} and γ_{ij} are constants, or regression coefficients,

X_i is an independent predictor or exogenous variable outside the system, and

e_i is a stochastic disturbance term assumed to be independently and normally distributed, with mean equal to zero and a constant, finite variance σ_i^2.

This concludes the discussion of the theoretical model. A review of literature is presented as Appendix A to support the postulated relationships within the model.

Methods for testing the mass media content - attitude change hypothesis are presented next, followed by the results and discussion. Then, methodological procedures for testing the communication model are presented, followed by the results and discussion.

METHODS -- CONTENT ANALYSIS AND ATTITUDE CHANGE

Methodological considerations necessary to test the mass media content-attitude change hypothesis are divided into four phases:

1. The selection of locations and times of known air pollution situations appropriate for hypothesis testing.
2. The development of operational measures of mass media content and attitude change.
3. The gathering of sufficient data to provide a basis for an empirical test of the hypothesis.
4. The specification of analytical procedures employed to test the hypothesis.

Each phase will be described in its respective order.

Selection of Location and Time

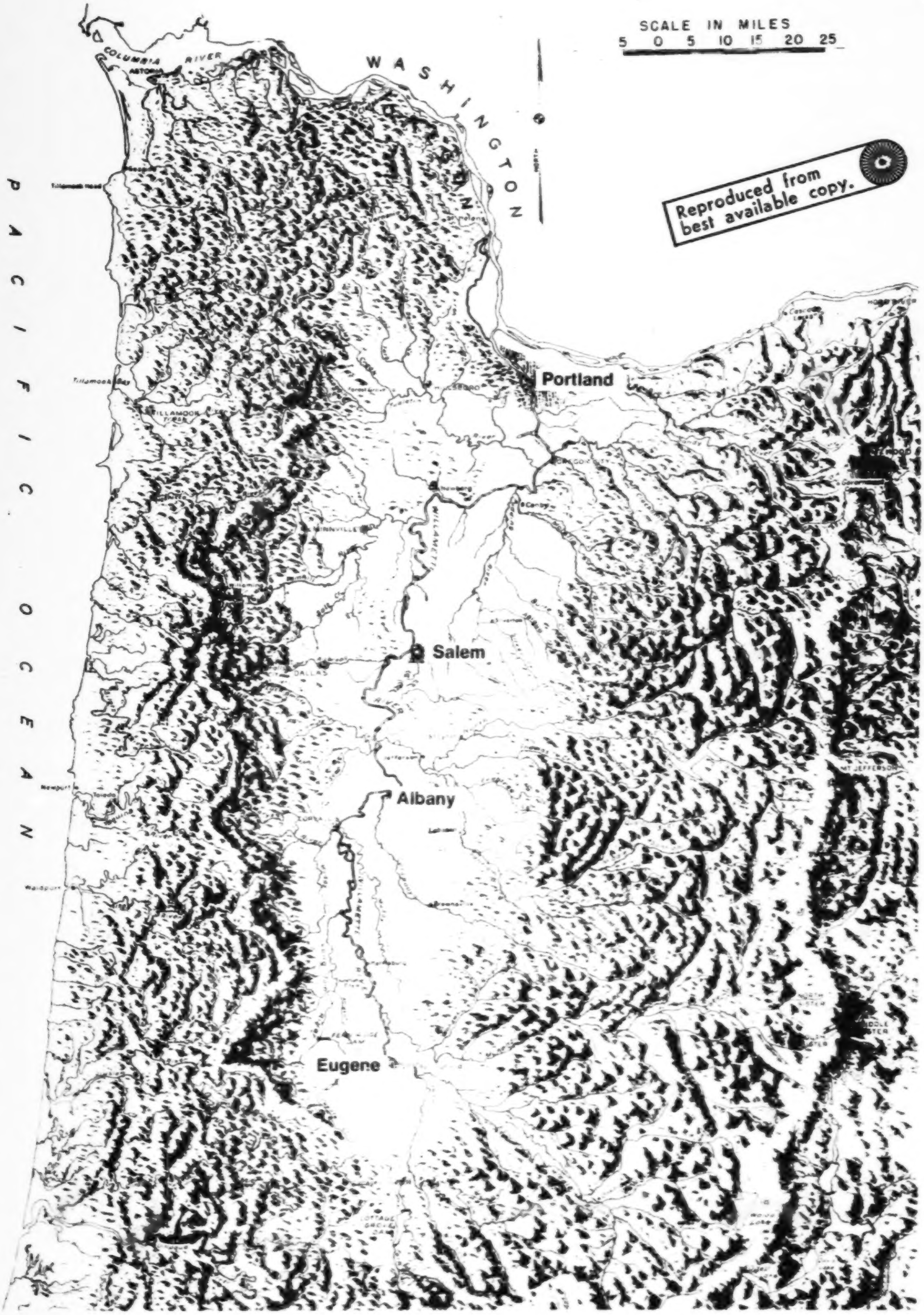
Several conditions are necessary to test the mass media-attitude change hypothesis. One is the selection of a community or communities where air pollution effects are severe enough to impinge on the public's consciousness. Another is a pollution situation which occurs with sufficient regularity that one can design a panel study and plan personal interviews to capitalize on this regularity. A third is a relatively high level of attention to air pollution sources and effects by the local mass media, particularly newspapers.

It seems most likely that one will find these conditions met in a situation where pollution externalities occur outside the polluting community and when an enforcer and polluter agree that feasible emission controls are not available. Social conflicts concerning emission restrictions are likely to occur, according to the discussion in the introduction (page 19). This conflict is likely to be reflected in relatively high levels of mass media attention and public awareness.

Several communities were considered for study shortly after the project began in early 1969. The cities of Eugene and Salem, Oregon, were selected. Because of its location at the base of the Willamette Valley, Eugene has experienced poor natural ventilation, whereas Salem, located in the mid-Willamette Valley, has had good natural ventilation. Therefore, a contrast in visibility would be expected to occur when there is air pollution in the Valley. Eugene's population was estimated at 109,614; Salem's, 95,748, according to the 1970 Census of Population [7].

One predictable source of air pollution was agricultural field burning. Farmers burn approximately 250,000 acres of post-harvest residue from grass seed crops in late summer or early fall in the Willamette Valley. Heat produced through straw and stubble burning provides at least partial control of a number of grass seed diseases and disorders. As well, other benefits recognized include effective and inexpensive residue removal, destruction of weeds and weed seeds and physiological stimulation of seed yields. No economically feasible alternative to field burning has yet been developed.

The largest and most concentrated area of grass seed production lies in the area between Albany and Eugene (see Figure 3). Emissions from burning consist of smoke (carbon particles of various sizes), ash and certain gases. Most individual carbon particles are minute and cannot be seen without visual aid. Larger particles can be seen easily by persons with normal vision. Large numbers of minute carbon particles are called "suspended particulates" and are a major source of reduced visibility. Larger particles, which settle more readily, are a source of soiling. Relatively large volumes of smoke emissions from agricultural field burning were considered an important stimulus for public concern, particularly in Eugene. For this study, a measure of visibility was employed as the measure of air quality. For a full presentation of the scientific basis for visibility, or visual range as it is sometimes called, see Middleton [31]. Robinson [37], for example, notes that the deterioration of visibility is probably the first indication of air


SCALE IN MILES
5 0 5 10 15 20 25
WASHINGTON
COLUMBIA RIVER
PACIFIC OCEAN
Portland
Salem
Albany
Eugene

Reproduced from best available copy.

Figure 3. Willamette Valley Basin and vicinity.

pollution about which a citizen becomes aware. Visibility was selected because it is most likely to have impinged on the consciousness of individuals in the study areas, compared to other forms of air pollution.

As well, any test of the mass media content-attitude change hypothesis must take into account any past definitional situation. Ideally, one would like to measure attitudes toward air quality prior to any definition (or redefinition); wait, hopefully, for events to be defined or redefined, then remeasure attitudes of the same individuals. This ideal situation is not likely to occur in practice, for the researcher has no control over mass media attention to air quality. An alternative procedure is that, given the inordinate time involved in content analysis, one artibrarily selects a time difference for measuring and remeasuring individuals when attitudes conceivably will change on the basis of known changes in air quality. After all, Zajonc [54] asserts that "mere repeated exposure" of the individual to a phenomenon is sufficient to enhance his attitude towards it. Attitude change scores are then related to changes in level of air quality. If the mass media content analysis shows no definition or redefinition within the time period of measures for attitude change, then the definitional hypothesis is not supported if an attitude change does, in fact, occur. If the content analysis specifies definition prior to measures of attitude change, and no measurable change occurs, then one would consider this data support for the definitional hypothesis. But, this support is not as strong as it would be if attitude measures were obtained prior to and after definition.

Such a design calls for measures of the same individuals during periods of high and periods of low visibility. Two interviewing waves were planned. The first, using Schedule A, contained measures of both endogenous and exogenous variables of the model. The second, using Schedule B, contained parallel forms of measures of attitude and knowledge variables. It was important to guarantee that use of Schedules A or B was not correlated with time of interview or visibility level. Otherwise, a confounding of effects might occur. Thus, the sample was drawn so that a random half of respondents was interviewed from each community in the following manner:

	May 1970 % respondents	Aug. -Sept. 1970 % respondents	January 1971 % respondents
Schedule A	50	50	
Schedule B		50	50

It was anticipated that visibility levels would be high in May 1970 and January 1971 but low in August-September 1970.[1/] It was also anticipated that the pattern of high and low visibility would be more pronounced in Eugene than in Salem, i. e., Eugene would have lower visibility levels than Salem in August-September. Timing interviews in this fashion would balance any effects between type of schedule (A or B) and time of interviewing. Those who were interviewed with Schedule A in May 1970 were reinterviewed with Schedule B in August-September 1970; those who were interviewed with Schedule A in August-September 1970 were reinterviewed with Schedule B in January 1971. Observers in both communities, trained by a representative of the Oregon State University Department of Atmospheric Sciences, completed visibility observations every two hours on the hour, beginning at 8 a. m. and continuing until dusk. This meant that seven observations per day were made in May and August-September, five per day in January. Observations were completed each day interviewers were in the field. In this fashion, professionals in the air quality field could compare levels of visibility between interviewing periods and between communities.

[1/] Five year visibility data from U. S. Weather Service stations at the Eugene and Salem airports were gathered to estimate more precisely the timing for interviews. This analysis disclosed that a four-week period from mid-May to mid-June and a four-week period in January were consistent periods of relatively high visibility. The analysis did not suggest a consistent timing for periods of low visibility; however, estimates by professionals in the O. S. U. Department of Atmospheric Sciences suggested that late August to mid-September was likely to be a period of deteriorated air quality.

Development of Operational Measures

Mass media themes were defined in the introduction as "assertions about some aspect of air quality". Themes served as recording units for measuring the content of communication; in this instance, mass media available in Eugene and Salem, Oregon, the communities selected for study. The first step in theme development in this study was to factor analyze intercorrelations among attitudinal items that were available from a pretest conducted among a random sample of individuals in Portland, Oregon. (Details of the pretest will be presented in the section concerning the methodology for testing the communication model. Suffice to say that pretest data were the earliest available attitudinal information that could be developed in the study.) The factor analysis disclosed six orthogonal factors and the first list of potential themes was developed from these factors. Each factor was characterized by a single statement. These statements, or tentative themes, could be written to express both a positive and a negative direction toward some aspect of the referent, air pollution. A random sample of 52 weeks of newspaper articles, in which some aspect of the referrent "air pollution" appeared at least once, was selected from an 11-year (1960-1970) collection of such articles. These articles had been reproduced from microfilm copies of the _Eugene Register-Guard_ and the (Salem) _Oregon Statesman_. Two trained coders, working independently, tested the six tentative themes on a sub-sample of articles, with the article serving as the unit of analysis. Discrepancies in coding were resolved by clarifying broad terms employed in the themes, by rewriting ambiguous themes and by writing new themes. Overlapping themes were omitted. The final list of 15 themes was then tested on the remainder of the sample articles. The final version of 15 themes was written as two lists to facilitate coding; one list, "for" clean air; the other, its negation, "against" clean air. These themes are:

Theme "For" Clean Air (Code 1)	Themes "Against" Clean Air (Code 2)
1. Air pollution is a health hazard.	1. Air pollution is not a health hazard.

Theme "For" Clean Air (Code 1)	Themes "Against" Clean Air (Code 2)
2. Air pollution is a menace to the public welfare.	2. Air pollution is not a menace to the public welfare.
3. Air pollution is becoming a serious problem and public opinion must pressure government into doing something to control it.	3. Air pollution is becoming a serious problem, but the use of public opinion to pressure government is not the way to control it.
4. Before the problem of air pollution becomes too serious, we can find the resources and technology to eliminate it by working together now.	4. (Not useful. See Code 1)
5. Air pollution is a problem caused by industry, and it is industry's responsibility to clean up the air.	5. Air pollution is not a problem caused by industry, and it is not industry's responsibility to clean up the air.
6. Industry is willing to cooperate in cleaning up its air pollution.	6. Industry is not willing to cooperate in cleaning up its air pollution.
7. Polluters are willing to use alternative methods of waste disposal even if they are convinced it is neither economically feasible nor technologically practical.	7. Polluters are willing to use alternative methods of waste disposal if they are convinced it is economically feasible or technologically practical.
8. Air pollution control agencies need more power if they are to control the problem of air pollution.	8. Air pollution control agencies already have enough power to control air pollution.
9. If air pollution control agencies are to be effective, they must be organized on a regional basis.	9. Air pollution control agencies need not be organized on a regional basis to be effective.
10. Air pollution may be a problem, and industry and economics are not as important as clean air.	10. Air pollution may be a problem, but industry and economics are more important than clean air.
11. Industry is a major contributor to the air pollution problem.	11. Industry is only a small contributor to the air pollution problem.
12. (Not useful. See Code 2)	12. It is difficult to place the blame for air pollution since it is not confined to any physical boundary.
13. Air pollution has always existed and it may be a problem, and something must be done to eliminate it.	13. Air pollution has always existed and it may be a problem, but there is nothing that can be done to eliminate it.

	Themes "For" Clean Air (Code 1)		Themes "Against" Clean Air (Code 2)
14.	The available means of controlling industrial air pollution is effective or technologically practical.	14.	The available means of controlling industrial air pollution is ineffective or technologically impractical.
15.	(Not useful. See Code 2)	15.	Air pollution is not a problem.

The negation of three themes was not useful and were omitted. An example is the theme "Air pollution is not a problem". Its negation, "air pollution is a problem" is not useful, since all themes in this direction imply the existence of a problem.

The measure for attitude change will be described in the section on analytical procedures, presented below, and in the section concerning attitude measurement which is presented in the methodology section for the communication model.

Data for Hypothesis Testing

Community newspapers provided the most appropriate source for measuring mass media content by counting frequency of themes. Microfilm copies of newspapers were readily available to reproduce selected articles for analysis. All newspaper articles -- news stories, features, editorials, letters-to-the-editor, advertisements -- which contained at least one reference to some aspect of air quality were reproduced from an 11-year period (1960-1970). The newspapers were the Eugene Register-Guard and the (Salem) Oregon Statesman. Two coders, working independently, read each article, noting the presence or absence of each theme. Each article was also coded for type of article (news, editorial, etc.); length (in column inches); story placement (front page or other); source of pollution cited (field burning, industrial, automobile, commercial, residential, meteorological, forestry, natural, other); and scope of problem (local, regional, state, out-of-state, national, world). As well, month, year and newspaper in which article appeared were coded. Discrepancies between coders were resolved by a referee. At least one coding discrepancy occurred in approximately 25 percent of the articles.

A total of 3, 054 articles was coded -- 1, 963 from the Eugene Register-Guard and 1, 091 from the Oregon Statesman. Approximately 16 percent of the articles from each newspaper contained no themes. These articles provided procedural information concerning some aspect of air pollution, such as notices of hearings before regional authorities. As well, coders agreed that 5 percent of the articles from each newspaper contained themes which could not be coded with the available list of themes. The remaining 79 percent of articles contained at least one theme and these articles provided the data base for analysis.

Analysis of Data

Analysis of mass media content frequencies will be described first; then measurement of attitude change will be presented. For mass media content, analysis consisted of a visual examination of a frequency distribution of total number of articles, of article type, of sources of air pollution and of themes across time. Time, in months, was the abscissa and frequency the ordinate. A three-month moving average was employed to smooth out the frequency curve. Nine graphs were planned. First, the frequency of total number of articles for the newspapers from each community was plotted on one graph. Second, the frequency of article type -- news story, feature, editorial, letter-to-the-editor -- was plotted, one graph for each community. Third, the frequency of pollution sources mentioned -- field burning, field burning and other sources, other sources only, and no source -- was plotted, one graph for each community. Fourth, the "for" clean air themes were plotted, one graph for each community. Finally, the "against" clean air themes were plotted.

If air quality (or some aspect of air quality) is defined as an issue, one would expect to find some sustained attention to the topic over time. Prior to being defined as an issue, one should find frequencies generally low with no systematic pattern discernable. At some point in time, however, frequencies should increase markedly and continue at relatively high rates with easily explanable patterns occurring. For example, once field buring is defined as an issue, one should expect increased attention to occur during the burning season, compared to the non-burning season. Yet, frequencies during post-definitional non-burning months should be higher than during pre-definitional months.[1/] Themes associated with definition should aid in conveying a description of the definition itself. By examining the frequency of themes, one may well be able to construct a dialogue for describing the mass media content at any specific period of time and, by comparison, note differences among particular time periods. For example, one would expect a pre-definitional description of field burning to differ markedly from a post-definitional description.

As well, one can fix the date after which to expect definition. Field burning began during World War II and reached a plateau of approximately 240, 000 acres by the late 1950's. Assuming that the pesticide controversy of the early 1960's was the forerunner of the present environmental movement, and that the publication of Silent Spring played a major role in defining the pesticide issue, then one should expect environmental issues to develop sometime after 1962, the date of publication. Public concern over air quality is expected to be one of these issues. The intent of this analysis is to

---

[1/] An estimate of grass seed acres burned in the Willamette Valley can be made from acres harvested, since the practice of burning had been widely adopted by 1960 for all grass seed crops (See Hardison [17]). Acres harvested showed no great fluctuations between 1959 and 1970, according to Middlemiss and Coppedge [30] and other sources at Oregon State University. The yearly total grass seed acres harvested were: 1959 - 241, 000; 1960 - 235, 700; 1961 - 216, 500; 1962 - 222, 000; 1963 - 215, 300; 1964 - 227, 500; 1965 - 225, 600; 1966 - 228, 100; 1967 - 216, 000; 1968 - 213, 000; 1969 - 225, 300; 1970 - 242, 700. Some grain acreage was burned in the 1960 decade but reliable estimates are not available.

determine the date of definition of air quality as an issue.

This concludes the analysis proposed for the mass media content frequencies. Next, analysis of attitude change scores will be described.

A regression equation, employing dummy variables, was written in an effort to adjust attitude change scores of individuals in each community for a number of effects, including the effect of a change in air quality. The equation was:

$$Y_i = f(X_0, X_1, X_2, X_3) \tag{4}$$

where

Y_i is final attitude score minus initial attitude score of the individual,

X_0 is 1 for mean effect,

X_1 is 1 if high visibility occurred first,
0 if low visibility occurred first,

X_2 is 1 if Form A used first,
0 if Form B used first, and

X_3 is initial attitude score of the individual.

Significance of coefficients was tested by Student's _t_. A significant _t_ value for the X_1 coefficient would provide evidence that a change in air quality was associated with a change in attitude.

RESULTS AND DISCUSSION --
CONTENT ANALYSIS AND ATTITUDE CHANGE

Results in this section are divided into four phases:

1. Results of the content analysis.
2. Analysis of visibility observations.
3. Analysis of attitude change scores.
4. Discussion of results.

Each section will be discussed in its respective order.

Results of the Content Analysis

Frequency distributions of types of content are presented in Figures 4-22. Time, in months, is the abscissa and frequency the ordinate for all Figures. The frequency curve is a three-month moving average. Figure 4 is the frequency curve for the total number of articles for Eugene and Salem, respectively. Figures 7 and 8 are frequency curves of the sources of air pollution mentioned for Eugene and Salem, respectively. Figures 9-20 are frequency curves for the "for clean air" themes for Eugene and Salem, respectively. There are two themes per chart, each theme number corresponding to those listed on Page 34. Curves representing the 12 themes were too concentrated to present on one chart. Two themes were selected which would appear to vary sufficiently in each graph so one can easily follow each curve visually. Figures 21 and 22 are frequency curves for the "against clean air" themes for Eugene and Salem, respectively. Figures 9-22 are presented as Appendix C.

It had been noted in the section on Methods -Content Analysis (Page 29) that analysis would consist of a visual inspection of the different frequency distributions to determine the approximate date when air quality was defined

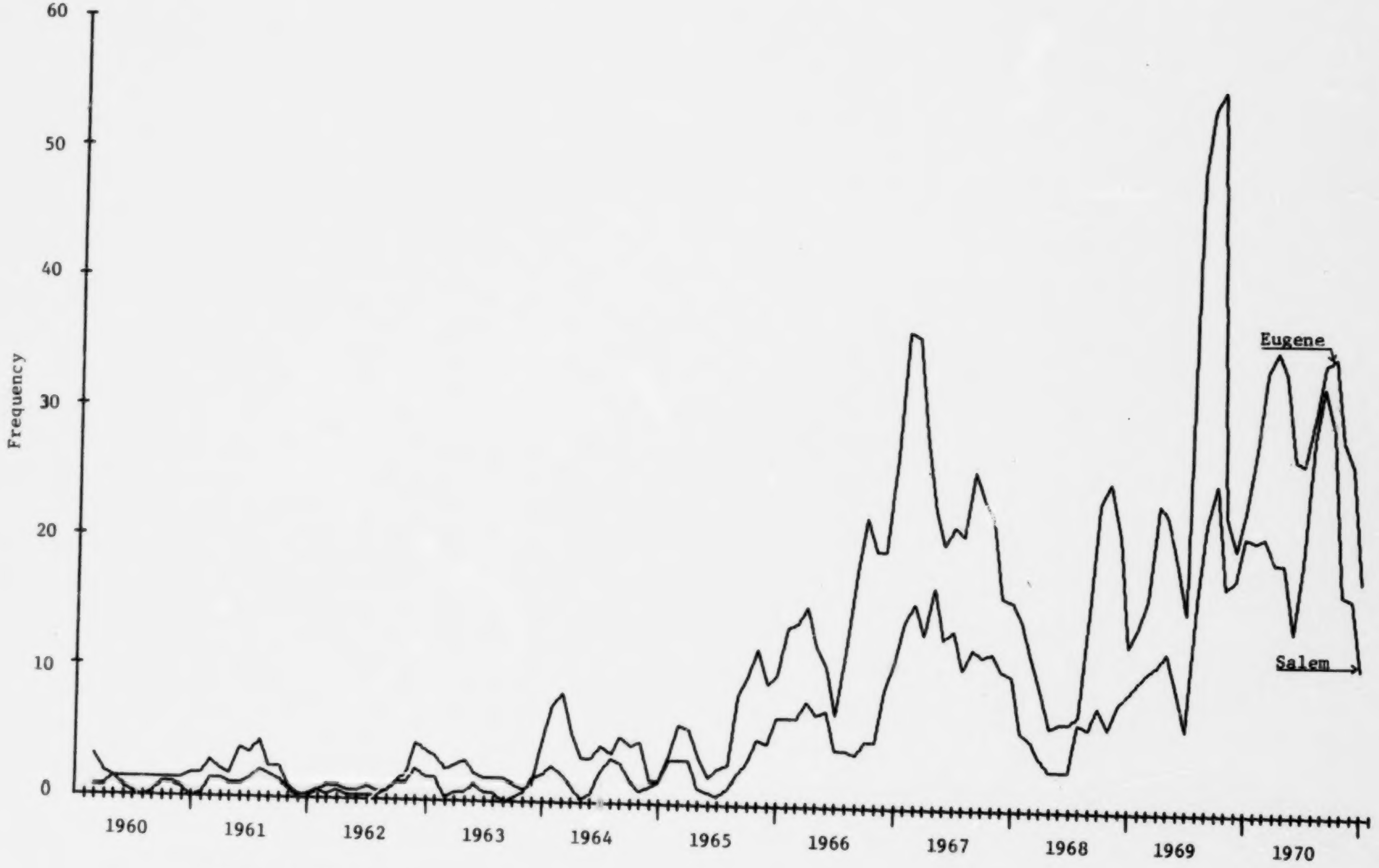


Figure 4. Frequency distribution for total number of articles, Eugene and Salem, 1960-1970.

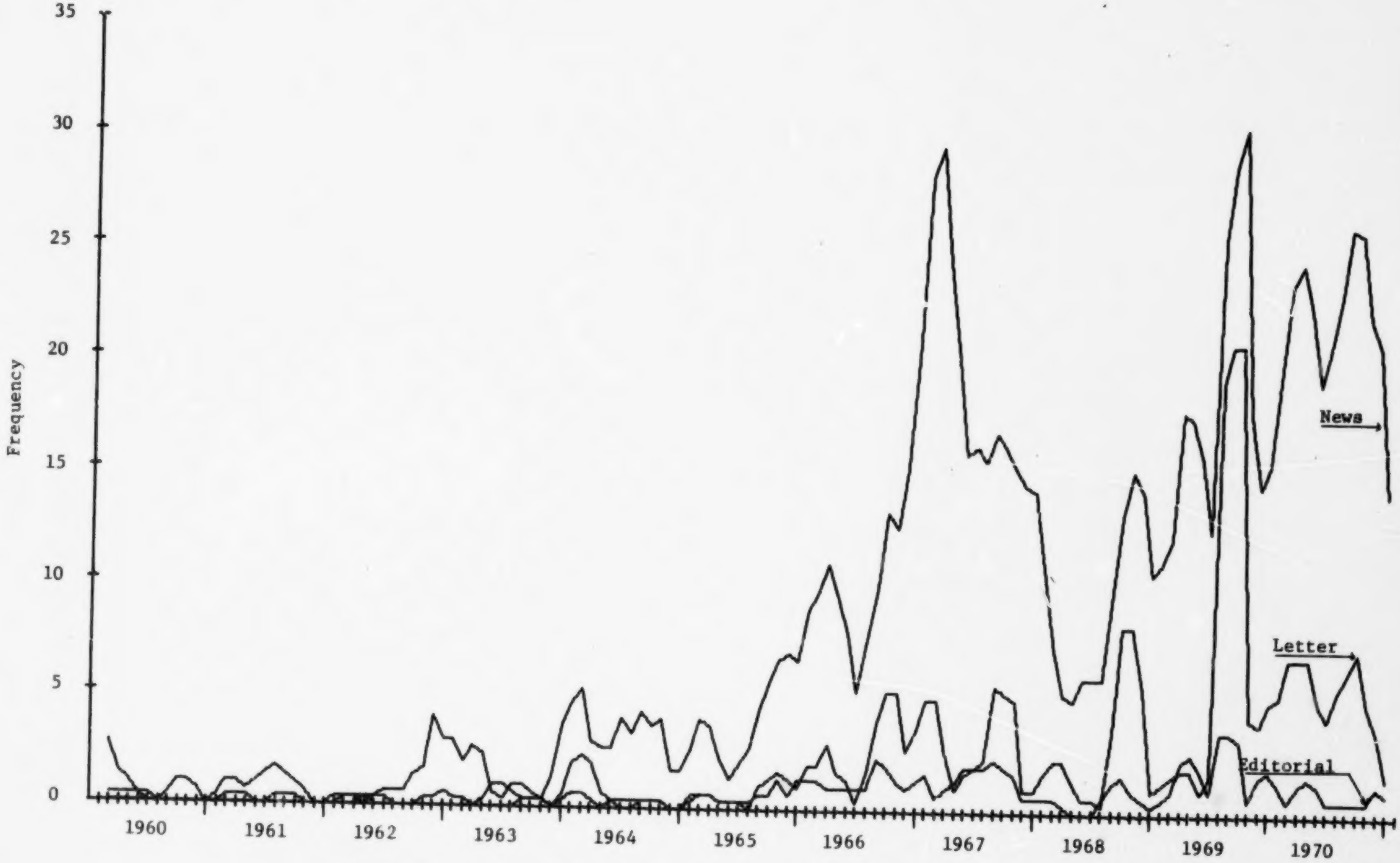


Figure 5. Frequency distribution for type of article, Eugene, 1960-1970.

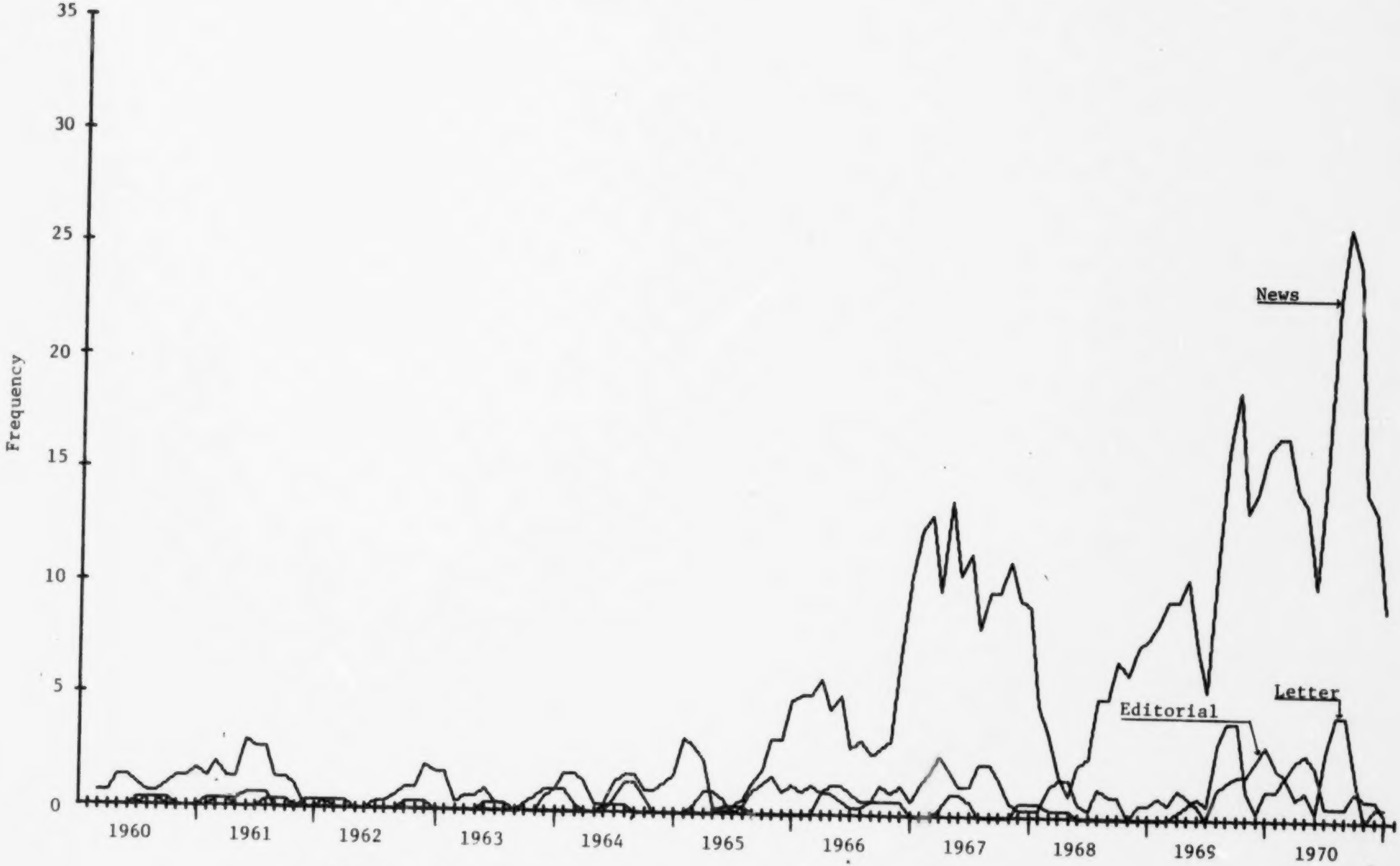


Figure 6. Frequency distribution for type of article, Salem, 1960-1970.

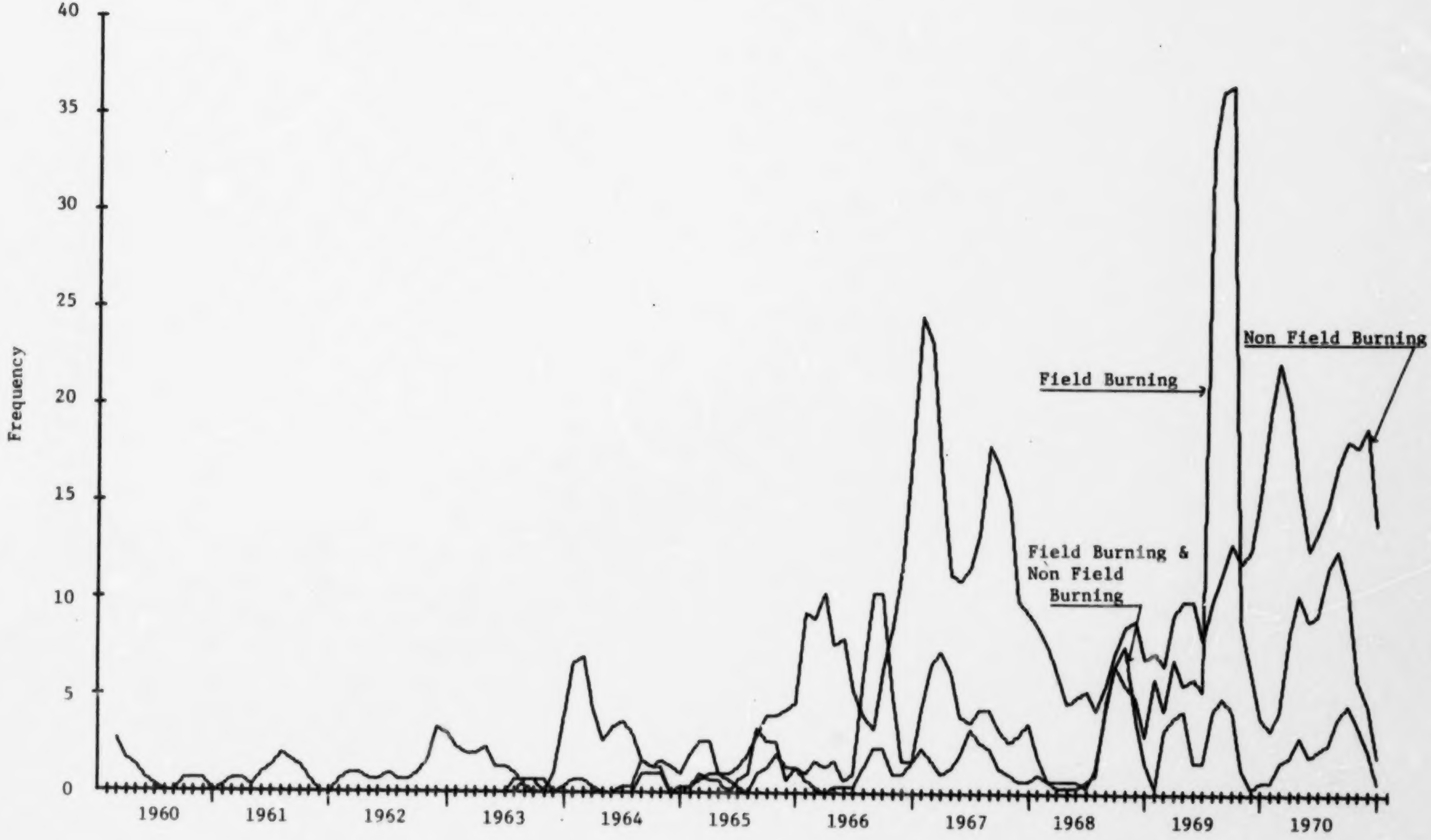


Figure 7. Frequency distribution for type of air pollution cited, Eugene, 1960-1970.

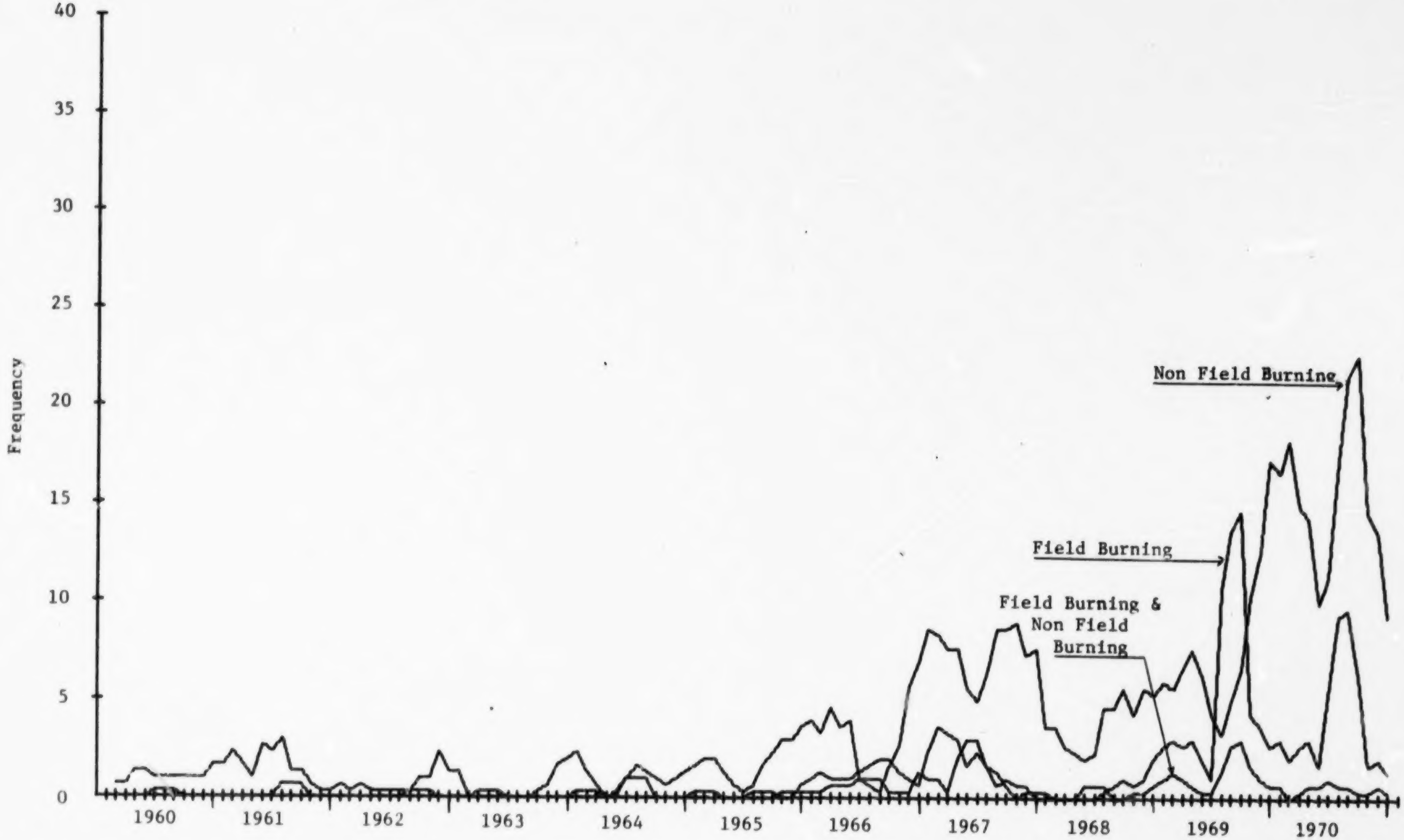


Figure 8. Frequency distribution for type of air pollution cited, Salem, 1960-1970.

as an issue. It was asserted that one should look for some sustained attention to the topic over an extended period of time. Prior to being defined as an issue, frequencies would be generally low with no systematic pattern discernible. At some point in time, however, frequencies should increase markedly and continue at relatively high rates with explainable patterns occurring.

Applying this very general guide to the data, it appears that the time of definition for Eugene occurred in 1966 or, possibly, early 1967. Frequencies never did reach the low levels prior to these dates -- even in early 1968 when the news was devoted to the presidential primaries. The pattern of "for clean air" themes was mixed with some continuing in use from 1966, others occurring primarily during the three-month field burning season of mid-July to mid-October of each year. The only exception to the definitional pattern was the frequency of "against clean air" themes. Frequency of these themes disappeared in the Eugene press in early 1968. The sharp rise of total mass media attention during the 1969 burning season underscores the occurrence of an episode in Eugene. On August 12, severe visibility restrictions prompted a delegation of Eugene residents to call on the state governor who returned with them to Eugene. The governor ordered a seven-day emergency ban on all field burning and called the Environmental Quality Commission into emergency session. Following the ban, a new quota system was established with farmers drawing lots to obtain permits to burn a share of the limited daily acreage allowed. The quota system was in effect for the 1970 and 1971 burning seasons.

The time of definition in Salem is less clear-cut. It is likely to have occurred in the late summer of 1969, perhaps as an effect of the episode in Eugene. Actions of the state governor, who resides in Salem, the state capital, may have defined the issue not only for Salem but for the state as well. There was an increase in frequency in 1967 but this increase dropped to near zero in early 1968. Sustained use, however, appears after the 1969 burning season; thus, the issue was likely defined by late 1969.

A study of the frequency of themes, types of articles and types of pollution sources cited suggests that the air quality issue in both communities was well defined prior to our interviewing of respondents in 1970. On the basis of the definitional hypothesis, one would not expect attitudes to change during the three-month interval between interviews. A null hypothesis is postulated.

Analysis of Visibility Observations

Visibility observations were grouped by distance and by source of restriction -- natural conditions or air pollution. The results are summarized in Table 5 (for Eugene) and Table 6 (for Salem). These results were analyzed by a faculty member of the Department of Atmospheric Sciences, and he concluded:[1]

a. For Eugene, visual restrictions due to air pollution were greatest in August-September and least in May and January. Visual restrictions due to natural conditions were greatest in January.

b. For Salem, visual restrictions due to air pollution were greatest in August-September and least in May and January. Visual restrictions from natural sources were greatest in January.

c. Visibility restrictions due to air pollution in Eugene were greater than in Salem for any distance in August - September.

Timing of interviews occurred during anticipated levels of visibility for each community as measured by visibility observations. May and January interviews were during periods of relatively high visibility; the August-September interview was during a period of relatively low visibility. As well, visibility in Eugene was less than visibility in Salem for the August-September interviews.

---

[1] Personal communication from Dr. E. W. Peterson, Assistant Professor of Atmospheric Sciences, Oregon State University, April 5, 1971.

Table 5. Summary of Visibility Data at Four Distances for Eugene, Oregon

Miles	Visibility*	May 1970 (7/13)**	Aug. - Sept. (7/17)	Jan. 1971 (5/10)
	O	.99	.95	.86
< 2	P	.01	.05	.02
	N	0	0	.12
	O	.99	.92	.64
< 3	P	.01	.08	.10
	N	0	0	.26
	O	.97	.76	.48
< 4	P	.03	.24	.16
	N	0	0	.36
	O	.77	.34	.42
< 8	P	.23	.66	.14
	N	0	0	.44
	(N)***	(91)	(119)	(50)

*
O - Percent of observation marker(s) visible.
P - Percent of observation marker(s) not visible due to air pollution.
N - Percent of observation marker(s) not visible due to natural conditions (fog, rain, snow, etc.).

** Number of observations per day divided by the number of days.

*** Number of observation-days.

Table 6. Summary of Visibility Data at Five Distances for Salem, Oregon

Miles	Visibility*	May 1970 (7/14)**	Aug.-Sept. (7/20)	Jan. 1971 (5/10)
	O	.98	.97	.82
< 2	P	.01	.02	0
	N	.01	.01	.18
	O	.98	.96	.56
< 3	P	.01	.02	0
	N	.01	.02	.44
	O	.93	.90	.40
< 4	P	.05	.09	0
	N	.02	.03	.60
	O	.98	.94	.42
< 5	P	.01	.04	0
	N	.01	.02	.58
	O	.92	.66	.28
< 8	P	.06	.29	0
	N	.02	.05	.72
	(N)***	(98)	(132)	(50)

---

* O - Percent of observation marker(s) visible.
P - Percent of observation marker(s) not visible due to air pollution.
N - Percent of observation marker(s) not visible due to natural conditions (fog, rain, snow, etc.).

** Number of observations per day divided by the number of days.

*** Number of observation-days.

Analysis of Attitude Change Scores

A regression equation (Equation (4), Page 39) was written to adjust attitude change scores for regression effects and to determine if a change in air quality was associated with a change in attitude. The coefficients obtained for Eugene and Salem were:

$$Y_{Eugene} = 15.8529 + \underset{(0.490)}{0.3670}\, X_1 + \underset{(0.507)}{0.3829}\, X_2 - \underset{(-6.100)}{0.2655}\, X_3 \tag{17}$$

$$Y_{Salem} = 2.3071 + \underset{(0.037)}{0.0295}\, X_1 + \underset{(2.957)}{2.2883}\, X_2 - \underset{(-9.107)}{0.3771}\, X_3 \tag{18}$$

Numbers in parentheses under the coefficients are Student's t values. For Eugene, only the coefficient associated with regression on initial attitude scores, X_3, was significant. For Salem, the coefficients associated with form effects, X_2, and regression, X_3, were significant. In neither community was the coefficient associated with level of visibility, X_1, significant. Thus, one can conclude that a change in air quality was not associated with a change in attitude (Y_i) in either community. A high proportion of the variance in attitude-change scores can be accounted for by regression effects; i. e., errors of measurement associated with scores of the dependent variable and, for Salem, by differences in form effects as well.

Discussion of Results

It was postulated, on the basis of a content analysis of the mass media, that one would not find a change in attitudes occurring during the 1970 interviewing period for respondents in both communities. The data presented in Equations (17) and (18) support this hypothesis. It appears that the mass media had defined the situation well before respondents were interviewed. If one had wished to detect an attitude change toward air quality in Eugene, he should have completed his initial interview prior to 1966; in Salem, prior to 1969, according to the content analysis.

An examination of the frequency curve in Figure 4 (for Eugene only) and Figure 7 (for field burning only) reveals an interesting pattern associated with the field burning months of each year (mid-July to mid-October) beginning with 1965. Mass media attention appears to increase sharply during these months each year. Speculating a bit on this repeated pattern of attention leads one to ask if the media were responding to greater visibility losses each year or if some other phenomenon was operating. One wonders why, after a relatively long history of field burning and, ostensibly, reduced visibility in the Eugene area, the mass media began showing an interest in 1965 and in subsequent years.[1] The question may have been partially answered in the discussion concerning the environmental movement and definitional process presented in the Introduction.

Yet, one must ask further if increased attention to field burning in Eugene in the 1965 to 1969 years altered the field burning habits of farmers sufficiently to contribute to the episode of 1969.

To answer this latter question, one must assume as a premise the stipulation that grass seed farmers are entrepreneurs; i. e., they are risk-taking decision makers who are motivated by profits. As entrepreneurs, they have established a set of priorities for farming practices, including field burning, to achieve their objective. The time of field burning, then, is normally dictated by profits.

Now, suppose farmers perceive hostility toward one of their essential production practices, field burning, which threatens their ability to obtain profits. Their possible behavior alternatives may be ranked on the basis of guarantees that field burning will be completed each year. Since each farmer is an entrepreneur, it is likely that field burning will tend to be completed as soon as possible after harvest -- in some cases fields just harvested will be burned before other fields are harvested. Suppose, further, that rain or other conditions prevent harvest or field burning when some farmers would normally harvest or burn. Potential acres for burning accumulate and are burned immediately when conditions permit. Visibility restrictions then are likely to be more pronounced in Eugene and an increase in attention and concern by community residents follows.

---

[1] See Footnote 1, Page 38, for an estimate of grass seed acres burned yearly between 1959 and 1970. The data indicate that the greatest acreage burned was in 1959 and in 1970; the smallest acreage burned was in 1967 and 1968.

It may well be that a sequence of events, such as those described above, contributed to the episode of 1969. If this conjecture has merit, it means that the process culminating in the episode was set in motion in 1965 when attention to field burning effects first appeared in any substance in Eugene. As well, the continued arousal of attention and concern may have contributed to a worsening of air quality until some form of workable controls was established.

The process of visualizing the opinions of another group with some accuracy is termed 'co-orientation'. In this situation two or more groups may independently perceive a phenomenon and simultaneously comprehend their joint perceptions of the phenomenon. For a more complete description of the co-orientation concept and its role in consensus, see Scheff [39]. The concept may well be useful in explaining or accounting for episodes in other air pollution situations as well.

One would need to gather at least two diverse types of data to evaluate the efficacy of the co-orientation notion for explaining this particular episode. One type of data is an evaluation of visibility levels for Eugene prior to and including the establishment of field burning as a practice, and prior to and including the establishment of community attention and concern over the effects of field burning. Moreover, one would suspect that co-orientation is operating if there is a lack of correspondence between levels of visibility and mass media attention prior to 1965 and a correspondence between these variables from 1965 to 1969. The second type of data would be an in-depth interview of field-burning farmers to determine if their perceptions concerning reactions of Eugene residents altered their decisions about time of burning.

METHODS -- AIR QUALITY COMMUNICATION MODEL

A theoretical model has been developed which postulates that a person's attitude, mass media exposure and knowledge about air quality represents an interdependent system and that this system can be explained by a set of predictor variables.

Methodological procedures required to test the model empirically were divided into three phases:

1. The development of operational measures of the variables in the theoretical model. Here, summated response scores to items asked of the general public in a standardized questionnaire were used as measures in all cases.

2. The gathering of sufficient data to provide the basis for an empirical test of the model. A personal interview survey of a random sample of residents living in Eugene and Salem, Cregon, was completed.

3. The specification and estimation of the parameters of a set of equations by which the model was tested. A set of simultaneous equations has been specified and a test of significance of variables by two-stage least squares was planned.

Each phase will be described in its respective order.

Development and Evaluation of Operational Measures

Appropriate questions (items) were developed to represent operational measures of the variables in the model. Specifically, these variables were an individual's:

a. attitude toward air quality (attitude)

b. level of exposure to messages in the mass media about air quality (mass media exposure)

c. level of air quality knowledge (knowledge)

d. level of exposure to interpersonal information sources (interpersonal exposure)

e. level of experience with air pollution (experience)

f. level of social influence (influence)

g. level of formal education (demography)

h. level of formal science education (demography)

i. level of use of the environment (use)

(Note: the terms in parentheses will be used to designate each variable respectively)

Measurement of demographic, exposure and influence variables was straightforward and required only pretesting and evaluation. A first draft of the questions was written at the outset and incorporated in the pretest questionnaire.

Measures of the remaining variables were less straightforward. They required additional information before the items could be specified. First, measures of attitude and knowledge were considered; then measures of experience and use were considered.

Attitude and Knowledge. A content analysis of the local mass media and magazines published in recent years was employed. For the mass media, microfilm tapes of the daily newspapers in the two target cities were read independently by teams of two trained individuals each. All news stories, editorials, letters to the editor, etc., concerning air pollution were noted. Newspapers were the Eugene Register-Guard and the (Salem) Oregon Statesman. In addition, the Reader's Guide was surveyed for titles of magazine articles concerning air pollution. Time interval in all cases was the past six years -- January 1, 1964, through December 31, 1969. Appropriate material from these sources was reproduced by xeroxing. This resulted in 1, 417 articles from the Register-Guard, 687 articles from the Statesman and 163 articles from popular magazines.

Trained coders performed a content analysis of the xeroxed articles. The statement served as the unit of analysis. A statement is defined as an expression which denotes a complete idea and which has a referrent -- some aspect of air pollution, in this case. Statements were recorded on cards and coders independently classified them into either attitude or knowledge categories and into qualitative similar sub-classes within each category. A total of approximately 3, 200 attitude statements and 5, 350 knowledge statements was available for consideration as items.

Empirical support of the model requires knowledge of content or information presented in the mass media. The importance of this requirement can be noted quickly. It is possible that one will not find a relationship between mass media exposure and knowledge when an empirical test is made of the model. One explanation might be that items used to test such knowledge were not related to information available in the mass media. By confining one's attention to areas in which knowledge test items are constructed from statements in the mass media, one can rule out this alternative explanation.

Attitude statements were divided into mutually exclusive sub-categories. Items that were judged to be unambiguous and representative of various aspects of the respective attitude categories and that fit the "agree-disagree" type of response alternative were selected. The final list of potential attitude items was composed of 50 statements. These items represented the measure of the attitude variable in the pretest.

Knowledge statements were selected that were judged to be unambiguous and representative of various aspects of the respective knowledge categories. The final list of potential test items was composed of 223 statements. An accuracy rating of these statements was performed by a panel of experts in the air quality professions from the National Air Pollution Control Administration, Raleigh and Durham, North Carolina; and from professionals in Oregon and California. A total of 65 raters was asked to cooperate; 57 completed and returned their ratings.

Critical ratios were calculated for each item. A significant CR (at the .05 level) was established as a necessary condition for acceptance of an item in the knowledge test battery. Representativeness of each knowledge category and ease or appropriateness in an interview setting were other conditions necessary for acceptance. The final set of knowledge items pretested was composed of 40 items -- 20 true and 20 false.

Experience and Use. Intensive interviews of a sample of the public (40 in Eugene, 10 in Salem) were examined for statements concerning the public's experience with air pollution and use of the environment. Probes were directed toward these two areas. These interviews yielded several statements about past living and visiting experiences in areas where the respondents believed air quality problems existed and about use of the outdoors for work, leisure and living. Items were developed from these responses for pretesting as measures of experience and use.

Evaluation of Pretest Measures. A pretest interview schedule was developed from items representing measures of the several variables. The schedule was administered by personal interview to a random sample of 100 adults in the Portland (Oregon) Metropolitan Area in February 1970.

Responses were coded and scores key-punched for analysis. Analysis consisted, first, of selection of items from among the 50 attitude statements. Then estimates of reliability and the construction of parallel or comparable halves (forms) were completed for the items measuring attitude and knowledge.[1]

Fifty attitudinal items were subjected to an item analysis. Twenty-five respondents with the highest total scores and 25 with the lowest total scores were selected. These two groups served as criterion groups for evaluation of individual items. The following ratio was calculated for each item:

$$\underline{t} = \frac{\bar{X}_h - \bar{X}_l}{\frac{S_h^2}{n_h} + \frac{S_l^2}{n_l}} \qquad (5)$$

where

$\bar{X}_h$	is the mean score on a given statement for the high group,
$\bar{X}_l$	is the mean score on the same statement for the low group,
S_h^2	is the variance of distribution of responses of the high group to the statement,
S_l^2	is the variance of distribution of responses of the low group to the statement, and
n_h, n_l	is the number of respondents in the high and low groups, respectively.

---

[1] Parallel or comparable halves (forms) were used to avoid effects of memory transfer when individuals were remeasured in the full study. The procedure for item selection suggested by Horst [18] was followed. Form reliabilities reported in Table 1 may be inflated since they were computed from the same data used to construct the forms.

The value of t is a measure of the extent to which an item differentiates between high and low groups. If a t equaled 1.75 or greater, it was considered evidence that the average response of the high and low groups to a statement differed significantly. This analysis resulted in a deletion of 10 items with low t values.

Estimated Spearman-Brown split-half (odd-even) reliability coefficients for the several measures are presented in Table 1.

Table 1. Estimated Spearman-Brown Split-Half Reliability Coefficients for Pretest Measures of Variables in the Theoretical Model

Variable	No. of Items	Reliability Coefficient
a. Attitude toward air quality (Form A)	20	.83
b. Attitude toward air quality (Form B)	20	.78
c. Level of exposure to mass media	3	.44
d. Level of air quality knowledge (Form A)	20	.70
e. Level of air quality knowledge (Form B)	20	.80
f. Level of exposure to interpersonal information sources	2	.76
g. Level of experience with air pollution	3	.30
h. Level of social influence	5	.75
i. Level of education	1	---
j. Level of formal science education	19	.92
k. Level of use of the environment	16	.77

Reliability estimates for measures of mass media exposure and experience with air pollution are low and suggest a need for item revision. An examination of items measuring both variables disclosed evidence of ambiguous wording which would likely produce responses based on different frames of reference. New items were written in an attempt to overcome this difficulty, resulting in an increased number of items for measuring both variables.

An item analysis also was completed in an attempt to increase knowledge test reliability. Guliksen [16], for example, has shown that the test mean, standard deviation and reliability may be estimated from item parameters of difficulty and reliability index. An attempt was made to increase test reliability by making the average item variance smaller or the average item reliability index larger. This practice did not improve test reliability appreciably. Details are available in a separate publication (see Mason [26]).

Execution of the Sample Survey

Pretest questions surviving tests of reliability and item analysis constitute the basis for accepting items for use in the sample survey. Summed response scores of these items represented measures of variables in the model. The new interview schedule constructed for the sample survey was pretested itself to insure that its make-up maintained rapport between interviewer and respondent. The final interview schedule employed in the sample survey is presented as Appendix B.

Parallel or comparable forms had been developed for attitude and knowledge measures. As well, response alternatives were reversed for the third endogenous variable, mass media exposure and items reordered randomly in the battery. This produced a permutation of forms, or batteries, as measures of the three endogenous variables. These permutations were employed in order to randomize effects between forms and time of interview. The number of permutations was eight ($2^3 = 8$). Since both Eugene and Salem were divided into eight census tracts, one combination of forms was assigned at random to each census tract for the first, or initial, interview.

Sampling of Respondents. A two-stage area sample was employed for random selection of respondents from each community. Sample size was planned to achieve results having a specified degree of precision, viz.,

$$n = \frac{k^2 V^2}{D^2} \tag{6}$$

where

n is the sample size,

k is the constant associated with the probability that the sample value will have a relative error no greater than ±D,

V is the coefficient of variation, and

D is the relative error allowed.

The value of k was arbitrarily set at 3; V, calculated from pretest data, averaged 0.30 or less for variables in the model and D was arbitrarily established at 0.06. Solving for n in Equation (6) resulted in a sample size of 250 for each community. A design effect of 1.20 was assumed, raising the sample size to 300. A response rate of 0.85 for the first interview and of 0.77 to 0.80 for the second was also assumed. Application of these rates increased the sample size so it ranged from 444 to 464 for each community.

The latest metropolitan area maps were purchased from the office of the local planning commission for each community. Each map was divided into eight areas, following census boundary lines. It had been arbitrarily determined to select four households at random from each block in an effort to reduce effects of clustering or intraclass correlation. Random selection of 14 blocks from each census area would yield 448 households per city for interviewing -- within the range calculated in Equation (6).

Both metropolitan areas received an on-site inspection. Non-residential and new residential blocks were noted as were blocks that were above- or below-average in number of dwelling units (DU's). Non-residential blocks were eliminated prior to numbering and new residential blocks added. Above-average blocks were divided and below-average blocks were combined, all in an effort to adjust block size to a calculated average number of dwelling units. Blocks were numbered in serpentine fashion, and 14 blocks were selected at random from each census area, seven blocks for each pair of interview "waves".

Sampled blocks received an on-site visit to 1) ascertain the number of valid (i. e., occupied) dwelling units, 2) select at random a point to begin selection of DU's, and 3) select, by use of a table of random permutations, four dwelling units. Dwelling units within apartments or other contrived blocks were selected randomly as well. Addresses and distinguishing features at each DU were noted for preparation of interviewer listing sheets. One adult respondent was selected at random within each household by the interviewer, using a "face sheet" or "cover sheet" commonly employed for such purposes. Proper use of the "face sheet" guaranteed random selection of a respondent within each household.

Completion of Interviews. The first interviewing wave began May 15, 1970, and terminated June 2, 1970. This was considered the first "high" visibility condition.[1/] A total of 224 household addresses was specified in each city for each interview. Oversampling was planned in order to secure, if possible, more than 150 completed interviews. Panel attrition may have been high for the subsequent re-interviewing with Schedule B. Interviews for the "low" visibility condition began August 26, 1970 and were completed September 16, 1970. The third (and final) interview wave began January 5, 1971 and terminated January 16, 1971. This was considered the second "high" visibility condition.

Response rates for Schedule A were calculated by dividing the number of successful completions by 224. These are reported in Table 2. Response rates for Schedule B were the number of usable schedules divided by the number of usable Schedule A's.

[1/] See Page 32 for the interview design employed to test effects of changes in air quality.

Table 2. Response Rates for Interviewing

	Salem			Eugene		
Interview	May 1970	September 1970	January 1971	May 1970	September 1970	January 1971
	%	%	%	%	%	%
Schedule A	77	87		87	78	
Schedule B		83	87		87	87

The percent not-at-home and refusals are presented in Table 3.

Table 3. Percent Not-at-Home and Refusals

	Salem			Eugene		
Interview	May 1970	September 1970	January 1971	May 1970	September 1970	January 1971
	%	%	%	%	%	%
Schedule A	14(9)*	7(6)		6(7)	11(11)	
Schedule B		9(8)	8(5)		7(6)	9(4)

*Percentages in parentheses refer to refusals.

The not-at-home rate for Salem in May and the refusal rate for Eugene in September, both with Schedule A, appear high. An examination of block clusters assigned to interviewers did not reveal a pattern of not-at-home's for Salem. They appeared to be distributed uniformly across all blocks. The distribution of refusals in Eugene, however, was concentrated in blocks surrounding the University of Oregon and interviewers noted the cause of refusal in some instances as a saturation of previous interviewing by University students.

Any effect of Schedule A non-response may be partially reduced by the definition of the sampling universe. It was defined as residents who live in their respective dwelling units for six consecutive months or more after first contact. A set of items was developed and used for predicting early in Schedule A if a respondent was likely to move within the next six months. If it appeared that he was likely to move, the interview was terminated.

Since these "likely-to-move" respondents were not defined in the sampling universe, other dwelling units in the blocks where these respondents lived were sampled at random in an effort to build up the level of completed interviews. It turned out that "likely-to-move" households were correlated within their respective blocks. It was not always possible to complete four interviews in these blocks. No more than four "likely-to-move" respondents in such blocks were included among the "successful completions" for the calculation of Schedule A response rates.

Assuming that measures to determine length of residence were valid, it is likely that some not-at-home's or refusals would include some people not defined in the population. If so, any non-response bias would likely be reduced commensurately. But, without confirming information, it is safer to state that some non-response bias is likely to exist for the Schedule A interviews. The direction and extent of this bias are not known. The Schedule B response rate averaged 86 percent and effects of non-response bias from reinterviewing sources are expected to be less than that for Schedule A.

Completion of Coding, Key-Punching, and Verification. The response rates represented 673 usable Schedule A's and 579 usable Schedule B's. Efforts employed to transfer the information in these questionnaires to data processing cards were, first, to code the questionnaires according to a predetermined code key. Next, two coders independently checked each questionnaire for accuracy. Third, data were key-punched and verified. Fourth, a print-out was obtained for all data and was proofread and rechecked with the questionnaires. Fifth, a computer column displacement program was applied and discrepancies sight-checked. Finally, a second computer print-out was proofread and rechecked with the questionnaires.

Analysis of Data

Analysis consisted of, first, an estimate of reliability for measures representing variables of the model and, second, a test of significance for variables in the model by two-stage least squares.

Estimates of Reliability. Spearman-Brown split-half analyses were completed for scores representing variables in the model, except for the measure of attitude change. In this case, Formula (7) was applied:

$$r_{dd} = \frac{r_{xx} + r_{yy} - 2r_{xy}}{2 - 2r_{xy}} \qquad (7)$$

where

r_{dd} is the estimated reliability of the attitude change scores,

r_{xx} is the estimated reliability of the Form A scores,

r_{yy} is the estimated reliability of the Form B scores, and

r_{xy} is the Form A, Form B correlation coefficient.

Estimates of reliability for variables in the model are given in Table 4.

Table 4. Estimates of Reliability for Variables in the Model

Variable	Reliability Coefficient	
	Eugene	Salem
Attitude change (20 items vs. 20 items)	.45	.52
Attitude level (40 items)	.90	.91
Mass media exposure (newspaper, magazine, TV)	.71	.65
Knowledge (40 items)	.81	.75
Interpersonal exposure (neighbors, friends)	.79	.73
Experience with air pollution (5 items)	.33	.19
Social influence (5 items)	.54	.58
Level of science education (19 items)	.91	.94
Use of the environment (16 items)	.73	.71

Items employed for measurement of the "experience with air pollution" variable did not intercorrelate particularly high. Thus, the reliability coefficient was low. It was considered too low for the variable to function in the analysis of the model. Therefore, this variable was dropped from further consideration. Reliability estimates of other variables were considered sufficiently high for their inclusion in the subsequent analysis.

Two-Stage Least Squares. Equations (1), (2), and (3) have been written (Page 28) to describe the theoretical model. As a number of scholars have demonstrated (e.g., Johnston [22], Valvanis [53]), least squares applied to each of the above equations will lead to estimates of the parameters which are biased and inconsistent. In addition, such estimators are less efficient than those obtained by alternative procedures.

For example, consider two-stage least squares:

$$Y_1 = \pi_{11}X_1 + \pi_{12}X_2 + \cdots + \pi_{16}X_6 + v_1 \tag{8}$$

$$Y_2 = \pi_{21}X_1 + \pi_{22}X_2 + \cdots + \pi_{26}X_6 + v_2 \tag{9}$$

$$Y_3 = \pi_{31}X_1 + \pi_{32}X_2 + \cdots + \pi_{36}X_6 + v_3 \tag{10}$$

where

$$\pi_{ij} = f(\beta_{ij}; \gamma_{ij}), \text{ and}$$

$$v_i = g(e_i; \beta_{ij}; \gamma_{ij}).$$

Since the e_i's are normally distributed with mean equal to zero, finite and constant variance σ_i^2, and the v_i's are linear forms of e_i's, then the v_i's themselves are normally distributed, with mean equal to zero and finite and constant variance σ_i^2. Therefore, Equations (8), (9) and (10) (referred to as reduced form equations) were estimated by least squares, since each contains only one endogenous (Y) variable.

This constituted the first step of the two-stage least squares solution.

Having estimated the functions in Equations (8), (9) and (10), one proceeded to obtain estimated values for the endogenous variables, Y_1, Y_2, and Y_3, and these will be denoted as $\hat{Y}_1$, $\hat{Y}_2$, $\hat{Y}_3$. The next step was to fit the function:

$$Y_1 = \beta_{11}\hat{Y}_2 + \beta_{12}\hat{Y}_3 + \gamma_{11}X_1 + \cdots + \gamma_{12}X_2 + e_1 \quad (11)$$

$$Y_2 = \beta_{21}\hat{Y}_1 + B_{22}\hat{Y}_3 + \gamma_{21}X_3 + \cdots + \gamma_{22}X_4 + e_2 \quad (12)$$

$$Y_3 + \beta_{31}\hat{Y}_1 \quad \beta_{32}\hat{Y}_2 + \gamma_{31}X_2 + \cdots + \gamma_{33}X_6 + e_3 \quad (13)$$

by ordinary regression techniques.

The resulting estimators, the β's and the γ's are biased but are consistent and more efficient than straightforward least squares estimators.

Having completed this routine, and having acquired estimators of the several β's and γ's in the system, and knowing the values of $X_1 \cdots X_6$, it is possible to solve the original system (Equations (1), (2), and (3)), for the values Y_1, Y_2, and Y_3. To distinguish these estimates from those obtained from the reduced form (Equations (8), (9), and (10)), they will be indicated as $\hat{\hat{Y}}_1$, $\hat{\hat{Y}}_2$, and $\hat{\hat{Y}}_3$, and referred to as structural equations:

$$\hat{\hat{Y}}_1 = \beta_{11}\hat{Y}_2 + \beta_{12}\hat{Y}_3 + \gamma_{11}X_1 + \cdots \gamma_{12}X_2 + e_1 \quad (14)$$

$$\hat{\hat{Y}}_2 = \beta_{21}\hat{Y}_1 + \beta_{22}\hat{Y}_3 + \gamma_{21}X_1 + \cdots \gamma_{22}X_4 + e_2 \quad (15)$$

$$\hat{\hat{Y}}_3 + \beta_{31}\hat{Y}_1 + \beta_{32}\hat{Y}_2 + \gamma_{31}X_1 + \cdots \gamma_{33}X_6 + e_3 \quad (16)$$

Therefore, parameters of the structural equations were estimated by the method of two-stage least squares. Significance of constarts in these equations was tested by Student's t, recognizing, however, that some degree of bias is involved.

By comparing scores of individuals in the two communities, the null hypothesis concerning the difference of each endogenous (Y_i) variable between communities was tested.

RESULTS AND DISCUSSION--A TEST OF THE AIR QUALITY COMMUNICATION MODEL

Results in this section are divided into four phases:

1. Results of accuracy of air pollution perceptions.
2. Empirical test of the communication model.
3. Empirical test of the revised communication model.
4. Discussion of results.

Results of Accuracy of Air Pollution Perceptions

A condition stressed throughout this study has been the selection of an air pollution situation which has "impinged on the consciousness of people in the community selected for study". An operational corollary to this condition is the contention that people are able to compare visibility levels from one time period to another and that the substance of this comparison can be ascertained by survey methods. While visibility differences may well exist between specified time periods, as measured by trained observers, there is no assurance that accurate perceptions will be distributed uniformly among people in the community. It may well be that the communication process concerning air quality for those who hold accurate perceptions will differ from those who hold inaccurate perceptions or no perceptions at all. Before testing the communication model it may be profitable to examine the nature of perceptions concerning visibility to determine if analysis of the model should be adjusted to include effects of perceptual differences.

An opportunity existed to examine such differences in this study. Perceptual accuracy was determined by scoring responses to one question asked at the end of the second (Schedule B) interview. In September, for example, this question was:

> "Within the last three weeks, would you say that the air pollution in Salem (Eugene) is better or worse than when we talked to you earlier this year in May?"

Responses to this question were compared to the analysis of visibility observations. A "worse" response in the September interview and a "better" response in the January interview, for example, were considered accurate. Other response codes employed were "no difference" and "don't know" but these were not used to determine perceptual accuracy or inaccuracy. These responses are summarized in Table 7.

Table 7. Summary of Perceptions to Visibility

Perception of Visibility	May-September 1970		Sept. 1970 - Jan. 1971	
	Eugene	Salem	Eugene	Salem
	%	%	%	%
Accurate*	52	53	72	51
Inaccurate**	31	15	6	12
No difference	14	29	18	31
Don't know	3	3	4	6
TOTAL	100	100	100	100
(N)	(152)	(139)	(142)	(146)

$X^2 = 15.58$, 3 df; $p < .01$ $X^2 = 13.76$, 3 df; $p < .01$

---

* "Worse" response in May-September interview, "better" response in September-January interview.

** "Better" response in May-September interview, "worse" response in September-January interview.

Accuracy of perceptions concerning visibility varied by community (location effect) and by time of interview (timing effect). A statistical analysis of the data in Table 7 suggests a highly significant location effect, if one sums the Chi squares and degrees of freedom presented in the table. Switching the independent variables, i. e., controlling for location effects and testing for timing effects, resulted in a non-significant Chi square for Salem respondents but a highly significant Chi square ($X^2 = 28.90$, 3 df; $p < .001$) for Eugene respondents. Testing for a possible location x timing interaction effect involved the routine suggested by Snedecor [43]. This resulted in a pooled Chi square of 11.67, with 3 degrees of freedom, significant at the .01 level. Thus, much of the variation in perceptual accuracy can be accounted for by three effects -- a location effect, a timing effect (for Eugene only) and an interaction effect. Location effects had been anticipated, given the history of air pollution in the Eugene area. Timing and interaction effects, however, were a surprise. There seemed to be little theoretical basis for predicting that Eugene should experience a higher level of inaccurate responses in September than in January. Responses to an open-ended item asking respondents to describe how or in what way they believed air pollution was better were studied for those interviewed with Schedule B in September. A sample of verbatim responses associated with accurate and inaccurate perceptions is presented as Appendix D.

It became clear that one reason for a "better" response was an evaluation of attempts by the Oregon Department of Environmental Quality to manage smoke emissions during the 1970 field burning season. Daily acreage burning quotas were established with burning permitted when winds would likely blow smoke away from the Eugene area. The Eugene Register-Guard carried several articles on this management proposal prior to the first interview in May. It is conceivable, therefore, that facts concerning the forthcoming management of field burning became incorporated as part of the definition of the situation for many respondents. If such were the case, some respondents may well have ignored the May-September time frame posed by our perception question. Instead, they imposed their own defined time frame which included a comparison of 1970 management efforts with the pollution episode of the previous year. If this were the case, a "better" response would lead to spuriously inaccurate responses in the September Schedule B interview and to spuriously accurate responses in the January interview. In the first instance, respondents would be wrong for the wrong reasons; in the latter instance, right for the wrong reasons.

All September and January Schedule B open-ended responses were examined to test the definitional hypothesis. Responses were studied for statements concerning the management (or lack of management) of field burning emissions. If the definitional hypothesis is to be supported, one would expect fewer statements among Salem respondents, compared to Eugene respondents. Smoke emissions from field burning were less an issue in Salem than in Eugene. Next, a "better" response would be associated with a positive evaluative statement, *e. g.*, that field burning was being effectively controlled, compared to the previous year. As well, a "worse" response would be associated with a negative evaluative statement, *e. g.*, that field burning was not being controlled. No other response combination should be present; *i. e.*, one should not find a "worse" response associated with a positive evaluative statement nor a "better" response associated with a negative evaluative statement. The data are presented in Table 8.

Table 8. Relationship Between Perceived Management of Field Burning Smoke Emissions and Accuracy of Visibility Perceptions

Level of Management	August-September 1970				January 1971			
	Accurate*		Inaccurate**		Accurate**		Inaccurate*	
	Eugene	Salem	Eugene	Salem	Eugene	Salem	Eugene	Salem
	%	%	%	%	%	%	%	%
Field burning controlled	0	0	40	24	27	7	0	0
Field burning not controlled	10	5	0	0	0	0	22	6
Total number of respondents	(79)	(73)	(47)	(21)	(103)	(75)	(9)	(18)

* "Worse" response.

** "Better" response.

The data support the definitional hypothesis. In all cases more Eugene respondents cited evaluative statements than Salem respondents. Moreover, it does appear that timing and interaction effects were produced, in part, by the application of a pre-defined time span in response to our air quality perception question. Thus, any attempt to measure the accuracy of perceptions in Eugene is likely to be confounded by past definitions of the situation. Such confounding raises questions concerning the validity of the method employed for determining perceptual accuracy in Eugene. This confounding is not apparent for the measurement of perceptual accuracy in Salem. Effects of perceptual differences will be considered prior to testing the communication model in Salem.

An additional source of potential error also was examined. Known visibility levels were employed for scoring accuracy of responses concerning perceptions of air quality. It may well be that visibility was not employed by some respondents in their evaluation of air quality. Odors and health effects are some of the possible alternatives, for example. Open-ended responses were coded for source and effect of air pollution mentioned. Analysis disclosed that visibility or visibility-related phenomena were cited by 92 percent of the Eugene respondents and 91 percent of the Salem respondents who proffered perceptual judgments. It appears that visibility was, indeed, an aspect of air quality that impinged on the consciousness of most of these respondents.

Empirical Test of the Communication Model

Preliminary analysis of the model involved the plotting of scatter diagrams between each exogenous and endogenous variable prior to analysis by two-stage least squares. The purpose of such diagrams was to ascertain visually the order of polynomial fitting the data. It was determined from this inspection that the relationship between all variables was linear and linear terms were employed for all reduced-form equations.

Measurable differences in perceptual accuracy were found among Salem respondents. It may well be that the communication process for those who hold accurate perceptions will differ from those who hold inaccurate or who hold "no difference" perceptions. A test of the appropriate residual sums of squares was made to determine if data for the three perception subgroups in Salem could be pooled and if the data for both Eugene and Salem could be pooled as well.1/ The procedure Ostle [36] describes was followed. Pooling of data for perception subgroups in Salem was tested first. Then, pooling of data for Eugene and Salem groups was tested.

When several sets of sample data are available, one is interested in determining if a single regression line can be used for all the data. The

---

1/ I am indebted to Dr. Norbert Hartmann, Department of Statistics at Oregon State University, for suggesting this procedure and for completing the calculations.

first step is to calculate the total residual sum of squares for each reduced form equation (attitude, mass media use, knowledge) in the model for Salem. The second step is to calculate the residual sum of squares of each perception subgroup for each reduced form equation of the Salem data and to sum these residual sums of squares. The third step is to subtract the residual sum of squares calculated in the second step from the total residual sums of squares calculated in the first step. One now has obtained two residual sums of squares -- one from Step two and one from Step three. Each of these residual sums of squares is divided by its respective degrees of freedom. Finally, an F-ratio is calculated for each equation with n_1 and n_2 degrees of freedom. If this F-ratio is statistically significant, the regression line for that equation differs among the different subgroups. If the F-ratio is not significant, regression lines for each subgroup are considered the same. and the data can be pooled.

The F-ratios for the different Salem perception subgroups and for the Eugene and Salem groups are presented in Table 9.

Table 9. Analysis of Variance, Degrees of Freedom and Significance Levels for Residual Sums of Squares of Equations of the Communication Model

Equations	F-Ratio	Degrees of Freedom	Significance Level
Combining over levels of perception for Salem:			
Attitude (Y_1)	1.98	14, 264	NS
Mass media exposure (Y_2)	1.24	14, 264	NS
Knowledge (Y_3)	<1.00	14, 264	NS
Combining over communities:			
Attitude (Y_1)	<1.00	7, 565	NS
Mass media exposure (Y_2)	1.34	7, 565	NS
Knowledge (Y_3)	3.34	7, 565	$p < .01$

The data show that one can pool the data for perception subgroups in Salem, but cannot pool the data for Eugene and Salem. The F-ratio associated with the knowledge equation is statistically significant.

Multiple correlations and zero-order correlation coefficients between each exogenous and endogenous variable are presented in Table 10.

Table 10. Multiple Correlation Coefficients and Zero-Order Correlations Between Each Exogenous and Endogenous Variable*

Exogenous Variable	Attitude (Y_1)	Mass Media Use (Y_2)	Knowledge (Y_3)
Eugene			
Interpersonal discussion (X_1)	.447	.520	.497
Social influence (X_3)	.382	.379	.425
Education (X_4)	.351	.190	.436
Science education (X_5)	.344	.238	.470
Use of environment (X_6)	.272	.262	.362
Multiple correlation coefficient	.591	.534	.622
Salem			
Interpersonal discussion (X_1)	.416	.510	.400
Social Influence (X_3)	.308	.362	.342
Education (X_4)	.281	.244	.421
Science education (X_5)	.253	.277	.419
Use of environment (X_6)	.274	.210	.373
Multiple correlation coefficient	.459	.524	.538

*$p < .05 = .113$; $p < .01 = .148$.

All the correlations in Table 10 are significant and the difficulty this poses will become apparent when the model, analyzed by two-stage least squares, is presented. The structural form of the model is shown in Equations (19) to (24). Numbers in parentheses under the coefficients are

Student's t values: (*) denotes $.05 < p < .10$; (**) $.01 < p < .05$; and (***) $p < .01$, one-tail test.

For Eugene, structural equations were:

$$\hat{Y}_1 = 71.5483 - \underset{(-0.049)}{0.0077\, X_1} + \underset{(0.346)}{1.5400\, \hat{Y}_2} + \underset{(3.350)^{***}}{0.1934\, \hat{Y}_3} \tag{19}$$

$$\hat{Y}_2 = -17.0699 - \underset{(-0.384)}{0.0496\, X_3} - \underset{(-3.886)}{0.8738\, X_4} + \underset{(7.379)^{***}}{0.2516\, \hat{Y}_1} \tag{20}$$

$$\hat{Y}_3 = -16.1449 + \underset{(1.833)^{**}}{0.0964\, X_5} + \underset{(1.105)}{0.0813\, X_6} + \underset{(2.523)^{**}}{0.2996\, \hat{Y}_1} - \underset{(-0.331)}{0.4766\, \hat{Y}_2} \tag{21}$$

For Salem, structural equations were:

$$\hat{Y}_1 = 104.5422 + \underset{(1.577)^{*}}{2.9385\, X_1} - \underset{(-0.916)}{4.0849\, \hat{Y}_2} + \underset{(2.149)^{**}}{2.4626\, \hat{Y}_3} \tag{22}$$

$$\hat{Y}_2 = -10.7254 + \underset{(0.980)}{0.1118\, X_3} - \underset{(-1.363)}{0.2558\, X_4} + \underset{(6.216)^{***}}{0.1885\, \hat{Y}_1} \tag{23}$$

$$\hat{Y}_3 = -14.9355 + \underset{(1.296)^{*}}{0.1009\, X_5} + \underset{(1.133)}{0.0656\, X_6} + \underset{(2.268)^{**}}{0.2828\, \hat{Y}_1} + \underset{(0.034)}{0.0585\, \hat{Y}_2} \tag{24}$$

where

X_1 is level of exposure to interpersonal information sources,
X_3 is level of social influence,
X_4 is level of formal education,
X_5 is level of formal science education,
X_6 is level of use of the environment for recreation,
$\hat{Y}_1$ is level of attitude towards air quality,
$\hat{Y}_2$ is level of exposure about air quality in the mass media, and
$\hat{Y}_3$ is level of air quality knowledge.

One could reformulate the model on the basis of significant t values by deleting variables with low t values and t values with incorrect signs. In this instance, however, such a practice would result in an underidentified

Equation (21) of the Eugene model (set of equations). An alternative procedure was employed to reformulate the model. To begin with, chances are good that low observed _t_ values were produced, in part, by the effects of multicollinearity, _i. e._, at least one variable in an equation was adding little to the explained variance that was not already accounted for by other variables. One can check for this possibility by examining the ratio of the main diagonal element of the inverse matrix corresponding to the $i^{\underline{th}}$ variable and the reciprocal of the corrected total sum of squares of the $i^{\underline{th}}$ variable.[1] The ideal, but uncommon, situation is for this ratio to equal unity; however, unity can occur only if all other explanatory variables in the model were completely uncorrelated with the $i^{\underline{th}}$ variable. This rarely occurs in practice with sociological variables.

It can be shown that the relationship between the $i^{\underline{th}}$ ratio and the variance of the $i^{\underline{th}}$ variable accounted for by other explanatory variables in the model corresponds to the function:

$$D_i = \frac{1}{1 - R_{ij}^2} \qquad (25)$$

where

D_i is the ratio of the main diagonal element for the $i^{\underline{th}}$ variable, and

R_{ij}^2 is the variance of the $i^{\underline{th}}$ variable accounted for by all other explanatory variables.

Thus, when D_i is large, the variance of the $i^{\underline{th}}$ variable is already largely accounted for by other explanatory variables in the model. Variables with relatively high D_i values will tend to have large variances of their estimated coefficients; thus, very low precision of estimation will result -- even to the point that one is not sure of the sign of the coefficients. The values of Student's _t_, D_i, and R_{ij}^2 obtained for variables in the model are presented in Table 11. Variables with high D_i values were usually associated with low Student's _t_ values. Moreover, the occurrence of a large number of relatively high (_i. e._, greater than 10) D_i values was considered

---

[1] I am indebted to Dr. William G. Brown, Professor of Agricultural Economics at Oregon State University, for suggesting this procedure.

Table 11. The Values of Student's t, D_i and R^2_{ij} Associated with Variables in Each Model

Equation	Variable	Student's t	D_i	R^2_{ij}
(19)	X_1	-0.049	53.659	.981
	$\hat{Y}_2$	0.346	78.538	.987
	$\hat{Y}_3$	3.350	5.803	.828
(20)	X_3	-0.384	2.289	.563
	X_4	-3.886	1.935	.483
	$\hat{Y}_1$	7.379	3.588	.721
(21)	X_5	1.833	3.153	.683
	X_6	1.105	3.945	.747
	$\hat{Y}_1$	2.523	15.585	.936
	$\hat{Y}_2$	-0.331	85.523	.988
(22)	X_1	1.577	35.700	.972
	$\hat{Y}_2$	-0.916	58.880	.983
	$\hat{Y}_3$	2.149	12.370	.919
(23)	X_3	0.980	1.829	.453
	X_4	-1.363	1.600	.375
	$\hat{Y}_1$	6.216	2.360	.576
(24)	X_5	1.296	7.346	.864
	X_6	1.133	2.183	.542
	$\hat{Y}_1$	2.268	13.928	.928
	$\hat{Y}_2$	0.034	105.429	.990

unacceptable. Exogenous variables associated with high D_i values were noted, and intercorrelations among exogenous variables examined. The X_1 exogenous variable, interpersonal discussion, had the highest D_i value of all exogenous variables; as well, this variable was the only one correlating significantly with all other exogenous variables. And, as noted in Table 10, this variable correlated highest with all endogenous variables, except for knowledge (Y_3) in Salem. It quickly became apparent that this exogenous variable was improperly specified and was likely the source of difficulties encountered in the test of the model. The interpersonal discussion variable should have been endogenous.

A new model was formulated. Interpersonal discussion was considered a new endogenous variable. Social influence was specified as exogenous. Level of formal education was deleted (it correlated .80 or higher with level of science education) and a new exogenous variable, perceived seriousness of air pollution in a respondent's community of residence, was added. This variable was postulated to be positively related to attitude towards air quality. Thus, the new model contained four exogenous and four endogenous variables.

Conclusions based on significance tests of the reformulated model, however, must be viewed with caution. The equations were developed after data from the previous model had been examined. Such selection tends to capitalize on relationships which might be high because of sampling fluctuations. This research must be considered exploratory, due to the tentative nature of the theoretical model. Previous work cited to support the model usually employed comparisons between two variables considered one at a time; no previous work reported has attempted to estimate the more general relationships specified among all the variables simultaneously. When confronted with this type of situation, it is often necessary to experiment with different hypothesized systems. Consequently, one must be particularly cautious in interpreting tests of significance for the reason cited earlier. Data from the previous model will be employed to test the reformulated model. This test is less meaningful than if new data had been acquired.

Empirical Test of the Reformulated Communication Model

Pooling of data for perception subgroups in Salem and of data for Eugene and Salem groups was completed in a manner similar to that for the original model. The results are presented in Table 12.

Table 12. Analysis of Variance, Degrees of Freedom and Significance Levels for Residual Sums of Squares of Equations for the Revised Communication Model

Model	F-Ratio	Degrees of Freedom	Significance Level
Combining over levels of perception for Salem:			
Attitude (Y_1)	3.18	10, 270	$p < .01$
Mass media exposure (Y_2)	1.10	10, 270	NS
Knowledge (Y_3)	1.43	10, 270	NS
Interpersonal discussion (Y_4)	1.15	10, 270	NS

The data show that one cannot pool the data among the Salem subgroups. The F-ratio associated with the attitude equation is statistically significant. Further tests among the different residual sums of squares indicated that one could pool the inaccurate and "no difference" perception subgroups. Note that it would be inappropriate to test for combining over communities, since the equation for attitudes (Y_1) in Salem was significant.

Multiple correlations and zero-order correlations between each exogenous and endogenous variable of the reformulated model are presented in Table 13.

It was noted in Table 10 that all correlations were statistically significant; however, some correlations in Table 13 are not significant. As well, several of the intercorrelations among the exogenous variables of the reformulated model are not significant. Thus, the magnitude of the difficulty encountered in testing the original model is not likely to be repeated in the test of the reformulated model.

Table 13. Multiple Correlation Coefficients and Zero-Order Correlations Between Each Exogenous and Endogenous Variable

Endogenous Variable	Attitude (Y_1)	Mass Media Use (Y_2)	Knowledge (Y_3)	Peer Discussion (Y_4)
	Eugene*			
Social influence (X_3)	.382	.379	.425	.532
Science education (X_5)	.344	.238	.470	.193
Use of environment (X_6)	.272	.262	.362	.281
Seriousness (X_7)	.361	.124	.207	.218
Multiple correlation coefficient	.519	.313	.578	.548
Salem (inaccurate and "no difference" perceptions)**				
Social influence (X_3)	.375	.432	.431	.564
Science education (X_5)	.272	.295	.464	.250
Use of environment (X_6)	.409	.312	.434	.375
Seriousness (X_7)	.349	.310	.209	.281
Multiple correlation coe coefficient	.540	.410	.588	.617
Salem (accurate perceptions)**				
Social influence (X_3)	.258	.292	.260	.509
Science education (X_5)	.235	.254	.373	.236
Use of environment (X_6)	.154	.123	.304	.279
Seriousness (X_7)	.309	.221	.258	.187
Multiple correlation coefficient	.384	.359	.450	.530

* $p < .05 = 113$; $p < .01 = .148$

** $p < .05 = .159$; $p < .01 = .208$

The structural form of the revised model is presented as Equations (26) - (37). Equations (26) - (29) are for Eugene; Equations (30) - (32) for Salem respondents who held either inaccurate or "no difference" perceptions; Equations (34) - (37) are for Salem respondents who held accurate perceptions. Again, numbers in parentheses under the coefficients are Student's t values: (*) denotes .05 <p <.10; (**) .01<p <.05; and (***) p<.01, one-tail test. The empirically supported relationships of the reformulated model are shown as figures under each set of equations.

$$\hat{Y}_1 = 79.6640 + \underset{(3.793)^{**}}{3.2590\,X_7} + \underset{(4.086)^{***}}{1.6965\,\hat{Y}_3} + \underset{(1.049)}{0.9898\,\hat{Y}_4} \tag{26}$$

$$\hat{Y}_2 = 6.1917 + \underset{(4.715)^{***}}{0.1885\,\hat{Y}_3} + \underset{(2.762)^{***}}{0.5102\,\hat{Y}_4} \tag{27}$$

$$\hat{Y}_3 = -0.9212 + \underset{(4.366)^{***}}{0.1691\,X_5} + \underset{(1.605)^{*}}{0.0824\,X_6} + \underset{(4.181)^{***}}{1.3889\,\hat{Y}_2} \tag{28}$$

$$\hat{Y}_4 = -2.2366 + \underset{(5.920)^{***}}{0.6481\,X_3} + \underset{(1.570)^{*}}{0.0598\,\hat{Y}_1} - \underset{(-0.588)}{0.0596\,\hat{Y}_3} \tag{29}$$

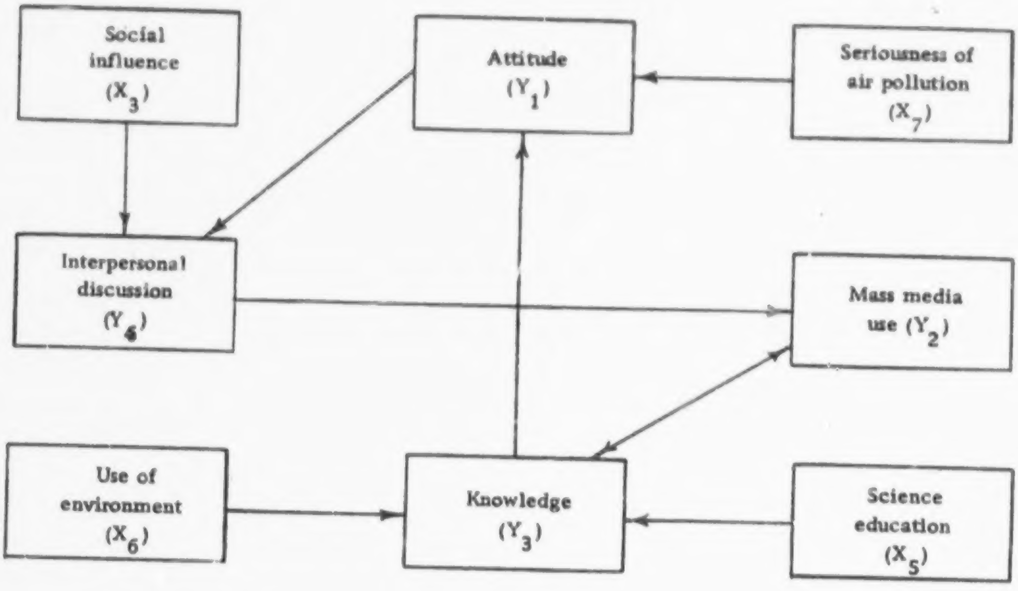

Social influence (X_3)
Attitude (Y_1)
Seriousness of air pollution (X_7)
Interpersonal discussion (Y_4)
Mass media use (Y_2)
Use of environment (X_6)
Knowledge (Y_3)
Science education (X_5)

Figure 23. Diagram of the communication model for Eugene.

In Equation (26) Air Quality Knowledge ($\hat{Y}_3$) and Perceived Seriousness of Air Pollution in Eugene (X_7) are significantly related to Attitude Level ($\hat{Y}_1$) while Interpersonal Discussion ($\hat{Y}_4$) is not. In Equation (27) Air Quality Knowledge ($\hat{Y}_3$) and Interpersonal Discussion ($\hat{Y}_4$) are significantly related to Mass Media Use ($\hat{Y}_2$). In Equation (28) Mass Media Use ($\hat{Y}_2$), Use of the Environment (X_6) and Science Education (X_5) are significantly related to Air Quality Knowledge ($\hat{Y}_3$). In Equation (29) Attitude Level ($\hat{Y}_1$) and Social Influence (X_3) are significantly related to Interpresonal Discussion ($\hat{Y}_4$) while Air Quality Knowledge ($\hat{Y}_3$) is not.

The next set of equations represents the communication model for Salem respondents who held inaccurate or "no difference" air quality perceptions:

$$\hat{\hat{Y}}_1 = 75.5231 + \underset{(2.006)^{**}}{2.6610\, X_7} + \underset{(1.888)^{**}}{1.4089\, \hat{Y}_3} + \underset{(1.400)^{*}}{2.3386\, \hat{Y}_4} \qquad (30)$$

$$\hat{\hat{Y}}_2 = -3.8072 + \underset{(1.691)^{**}}{0.3042\, X_3} + \underset{(3.573)^{***}}{0.1262\, \hat{Y}_1} \qquad (31)$$

$$\hat{\hat{Y}}_3 = 5.0937 + \underset{(2.770)^{***}}{0.1344\, X_5} + \underset{(2.043)^{**}}{0.1475\, X_6} + \underset{(2.787)^{***}}{0.9432\, \hat{Y}_2} \qquad (32)$$

$$\hat{\hat{Y}}_4 = -0.1090 + \underset{(2.487)^{***}}{0.8132\, X_3} + \underset{(1.861)^{**}}{0.2381\, \hat{Y}_1} - \underset{(-1.232)}{1.2257\, \hat{Y}_2} \qquad (33)$$

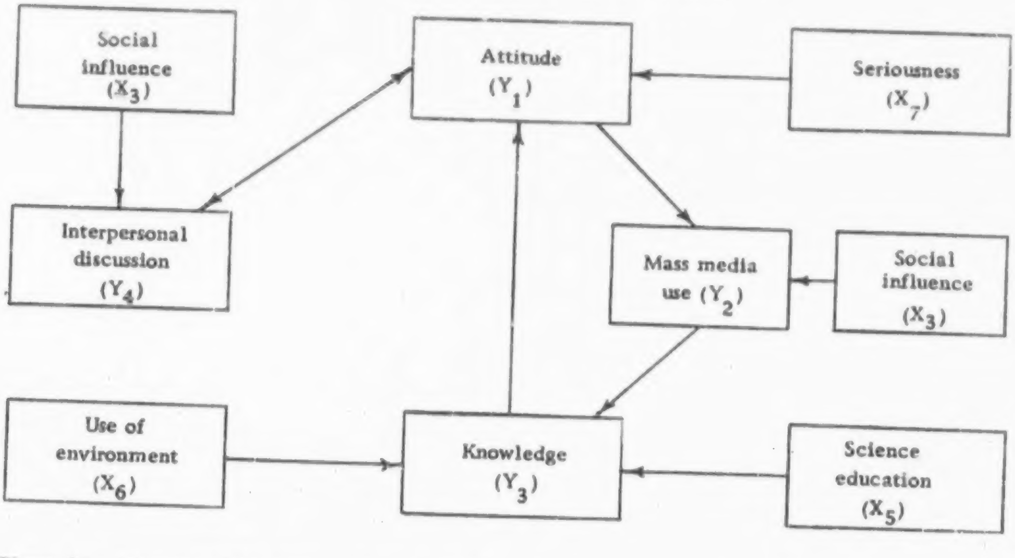

Social influence (X_3)
Attitude (Y_1)
Seriousness (X_7)
Interpersonal discussion (Y_4)
Mass media use (Y_2)
Social influence (X_3)
Use of environment (X_6)
Knowledge (Y_3)
Science education (X_5)

Figure 24. Diagram of the communication model for Salem respondents with inaccurate or "no difference" air quality perceptions.

In Equation (30) Air Quality Knowledge ($\hat{Y}_3$), Interpersonal Discussion ($\hat{Y}_4$) and Perceived Seriousness of Air Pollution in Salem (X_7) are significantly related to Attitude Level ($\hat{\hat{Y}}_1$). In Equation (31) Attitude Level ($\hat{Y}_1$) and Social influence (X_3) are significantly related to Mass Media Use ($\hat{\hat{Y}}_2$). In Equation (32) Mass Media Use ($\hat{Y}_2$), Science Education (X_5) and Use of the Environment (X_6) are all significantly related to Air Quality Knowledge ($\hat{\hat{Y}}_3$). In Equation (33) Attitude Level ($\hat{Y}_1$) and Social Influence (X_3) are significantly related to Interpersonal Discussion ($\hat{\hat{Y}}_4$) while Mass Media Use ($\hat{Y}_2$) is not.

The final set of equations represents the communication model for Salem respondents who held accurate air quality perceptions:

$$\hat{\hat{Y}}_1 = 90.6785 + \underset{(1.787)^{**}}{2.5098\, X_7} + \underset{(2.606)^{***}}{1.7735\, \hat{Y}_3} \tag{34}$$

$$\hat{\hat{Y}}_2 = 5.8974 + \underset{(1.768)^{**}}{0.2464\, \hat{Y}_3} + \underset{(1.447)^{*}}{0.3846\, \hat{Y}_4} \tag{35}$$

$$\hat{\hat{Y}}_3 = -5.1787 + \underset{(1.751)^{**}}{0.0955\, X_5} + \underset{(1.670)^{**}}{0.1034\, X_6} + \underset{(2.516)^{***}}{0.1940\, \hat{Y}_1} \tag{36}$$

$$\hat{\hat{Y}}_4 = 1.5990 + \underset{(5.004)^{***}}{0.5212\, X_3} + \underset{(1.480)^{*}}{0.1271\, \hat{Y}_3} \tag{37}$$

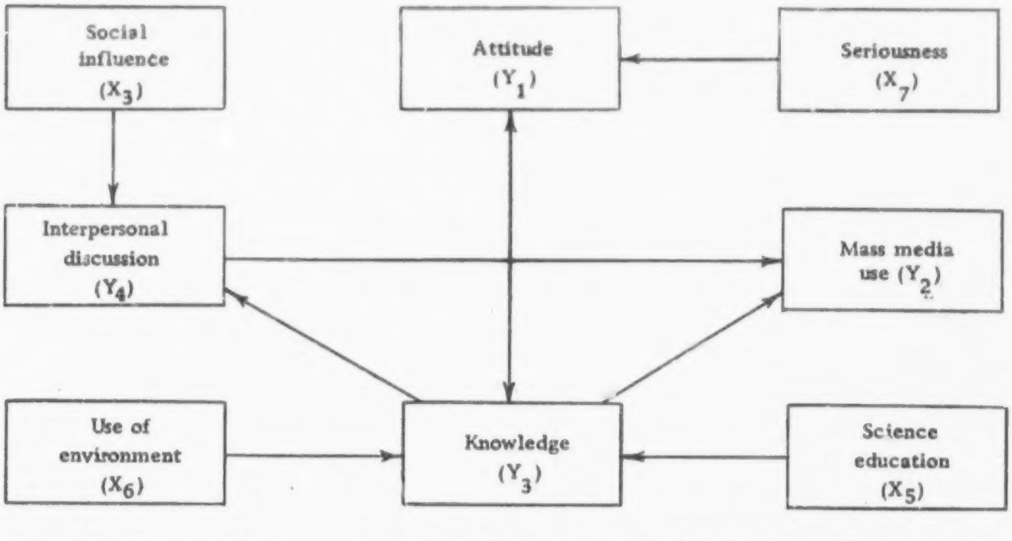

Social influence (X3)
Attitude (Y1)
Seriousness (X7)
Interpersonal discussion (Y4)
Mass media use (Y2)
Use of environment (X6)
Knowledge (Y3)
Science education (X5)

Figure 25. Diagram of the communication model for Salem respondents with accurate air quality perceptions.

In Equation (34) Air Quality Knowledge ($\hat{Y}_3$) and Perceived Seriousness of Air Pollution in Salem (X_7) are significantly related to Attitude Level ($\hat{Y}_1$). In Equation (35) Air Quality Knowledge ($\hat{Y}_3$) and Interpersonal Discussion ($\hat{Y}_4$) are significantly related to Mass Media Use ($\hat{Y}_2$). In Equation (36) Attitude Level ($\hat{Y}_1$), Science Education (X_5) and Use of the Environment (X_6) are significantly related to Air Quality Knowledge ($\hat{Y}_3$). In Equation (37) Air Quality Knowledge ($\hat{Y}_3$) and Social Influence (X_3) are significantly related to Interpersonal Discussion ($\hat{Y}_4$).

Discussion of Results

Results concerning statistically significant relationships among endogenous variables will be discussed for each model. Then comparisons will be made among the different models.

For Eugene respondents, the relationship between mass media use and air quality knowledge is interdependent, *i. e.*, one serves as the basis for the other and *vice versa*. High knowledge levels are associated with positive attitudes toward air quality which, in turn, are related positively to interpersonal discussion. High levels of interpersonal discussion are positively associated to high levels of mass media use.

For Salem respondents who held inaccurate or "no difference" air quality perceptions, positive attitudes toward air quality were positively associated with high levels of mass media use. Mass media use was positively related to air quality knowledge which, in turn, was related positively to attitudes. An interdependent relationship was found between attitudes and interpersonal discussion.

For Salem respondents with accurate air quality perceptions, an interdependent relationship was found between attitudes and air quality knowledge. High knowledge scores were positively related to mass media use and to interpersonal discussion. Interpersonal discussion was positively related to mass media use.

Moreover, the postulated relationship between mass media use and attitudes, as stipulated by the definitional hypothesis, is not supported by the data. It may be more correct to state that mass media use is positively related to knowledge and knowledge is positively related to attitudes. This type of relationship was found for all models.

It may be profitable to compare the different models, particularly since the analysis of mass media content disclosed such wide differences in the time of definition of air pollution as an issue in both communities. As well, the role of mass media use appears to vary according to community and to accuracy of perception. For example, an interdependent relationship was found in Eugene between mass media use and air quality knowledge. A dependent relationship was found between mass media use and knowledge among Salem respondents holding inaccurate air pollution perceptions. And, a dependent relationship was found between knowledge and mass media use among Salem respondents with accurate perceptions.

What may well be going on -- as one views the different models along a postulated time continuum -- is the evolution of a single communication process concerning this issue.

Initially, the issue is poorly perceived or defined with the communication process functioning much like that of Figure 24. The direction of the arrows for the endogenous variables suggest selectivity in information seeking. Those with more positive attitudes toward the topic interact or discuss it more with peers. As well, this interaction forms and reinforces their weak but positive attitudes toward air quality. Those who hold positive attitudes are greater users of the mass media and it is argued that this use is likely to be biased or selective in favor of these weakly-held attitudes. People tend to seek out information which supports their positive attitudes and to avoid or misperceive messages which threated or fail to support them. Greater mass media use, however, leads to higher levels of knowledge which tends to form and reinforce positive attitudes.

Next, after the passing of time, the accumulation of information from the mass media has led to a higher level of knowledge.[1] The communication process now may resemble that of Figure 25. Mass media use is no longer selective; i. e., it is not a function of attitude level. Rather, attitudes are well established and are now based primarily on level of accumulated knowledge. High knowledge levels now produce greater information seeking in both the mass media and with other people. It is argued that selectivity associated with the process in Figure 24 is likely to have been abandoned. Now, information seeking is unbiased, with knowledgeable people having formed well-differentiated and elaborate cognitive structures concerning air pollution.[2] Positive attitudes associated with these elaborate cognitive structures are relatively impervious to change -- unless there is a significant change in the cognitive structure itself. Incompatible information is not avoided or misperceived, for example, but is likely to be sought out and discounted through counter-argument. The mass media is used by both those high in knowledge and those who are involved in interpersonal discussion. It may well be that there is insufficient information available in the mass media channels to meet the information needs of more knowledgeable people. Otherwise, the direction of the arrow would likely go from mass media use to knowledge.

Finally, the process may evolve to a system much like that of Figure 23. The interdependence between mass media use and knowledge suggests a sufficiency of information about air quality in the mass media channels and that the more knowledgeable people are actively seeking out this information.

---

[1] Student's t values were calculated for attitude and knowledge means between Salem accurate and inaccurate or "no difference" subgroups. Means of both groups for both variables were statistically significant in the predicted direction (accurate means were higher) at the .05 level or less. Moreover, it is not likely that these differences were produced as artifacts of differences in exogenous variables. Student's t values were also calculated to test the significance of difference between means of each exogenous variable for both groups. No difference was statistically significant.

[2] The term 'cognitive structure' refers to the way an individual organizes his physical and social worlds, including all his facts, concepts, beliefs, expectations and the pattern of their interactions about the topic.

Moreover, higher knowledge levels support the more positive attitudes toward air quality which lead to greater interpersonal discussion. Those who discuss air pollution with others are also greater users of the mass media. Again, it is argued that information seeking at this stage of the process is also unbiased. Information inconsistent with or in refutation of existing knowledge, for example, is likely to be verified with some authority. Inaccurate or inconsistent public statements, for example, are likely to be challenged. And, one is likely to find that the air pollution knowledge levels of citizens in a community which has an attentive local mass media is remarkably sophisticated.

One can conclude that more than one communication model is functioning in a community at one point in time, depending on perceptions people have about the environment. As well, whether or not different models are functioning may well depend on how the local mass media, particularly newspapers, define the situation. Mass media use appears to play a significant role in the accumulation of knowledge which contributes to the establishment of attitudes. The decisions of mass media gatekeepers appear to be most relevant in determining the extent of knowledge the citizenry of a community may have about the local aspect of a complex issue. Word-of-mouth channels can function up to a point, but their ability to communicate valid information of a technical nature is limited, compared to newspapers, for example. The outcome of efforts to obtain clean air for a community may well rest, in part, with the decisions of these local mass media gatekeepers in the selection of information they employ to define the issue.

It is doubtful if one will find this particular communication process at work in all other types of air pollution situations. Consider, for example, the situation where the community which receives both the economic benifits and the externalities of a pollutor and where a pollutor and enforcer disagree over the feasibility of controls. One is not likely to find a positive linear relationship between attitudes and knowledge among community residents over this issue. Instead, a curvilinear relationship is more likely -- those who hold extreme positive or negative attitudes will have relatively high knowledge scores. Attitudes of those with low knowledge scores will likely be neutral, i. e., tend to have "no opinions". In this instance the role of the local mass media -- particularly newspapers -- may well have a bearing on any empirical relationship between attitude and knowledge. For if the local media "manage" the issue by not reporting it (or not reporting it fully), then one will need to consider the effects of possible alternative mass media sources, such as state newspapers, in the model. Otherwise, an empirical test of the model may disclose a null relationship between mass media use and knowledge. One decision required in developing such a model would be to build in the effects of the "localness" of the media itself.

The role of exogenous variables should be considered as well. The role of social influence and interpersonal discussion concerning air pollution can be more precisely defined. It was recognized in the review of literature that social influentials expose themselves not only to pertinent forms of the mass media, compared to those less influential, but are involved more in interpersonal discussion as well. Interpersonal discussion, however, plays a role in attitude formation at the initial stage of the communication process. The importance of interpersonal discussion may be attentuated once knowledge levels and attitudes are established. To be sure, social influence is related to interpersonal discussion at the latter stages of the communication process. But interpersonal discussion appears to lead only to greater mass media use. This use is related to higher knowledge levels. A direct relationship between interpersonal discussion and either knowledge or attitudes is not supported by the data. Thus, any information effort to improve attitudes concerning air pollution should take into account the significant role of these influentials at the initial stage of the effort.

The positive relationship between science education and knowledge, for example, suggests that knowledge levels among the better educated are likely to be higher than among the less educated. And, over time, the knowledge gap between the highly- and poorly-educated segments of a community will likely become larger, not smaller. Such a gap stems not only from higher initial knowledge levels but also from the use of the mass media as a learned skill for obtaining information. Tichenor et al., [51] have pointed out the statistical regularity associated with an increasing knowledge gap for different educational levels and the implications this has for the "mass" impact of the media; viz., that of reinforcing or increasing existing inequities in public knowledge. Thus, any program to employ the mass media in reaching large numbers of citizens with information concerning air pollution, for example, is likely to reach the already well-informed. This does not mean that the well-informed will not profit from any new information effort. It suggests that these individuals will be the primary beneficiaries of such an effort.

Use of the environment for recreation purposes, a significant predictor of air quality knowledge at all stages of the communication process, also plays a role as a source of attitude change as well. One question likely to arise when using two-stage least squares is to compare the relative effects of all the exogenous variables on each endogenous variable.[1/] For example, if a 1% change occurred in each exogenous variable, how much of a percent change would occur in each endogenous variable? Using level of attitudes as the endogenous variable, an answer to this question showed that social influence would produce the greatest change for Eugene and for Salem respondents who held accurate air pollution perceptions. In these instances a 1% change in social influence would change attitudes toward air quality by 10% for Eugene respondents and by 7% for Salem "accurate" respondents. Effects of other exogenous variables were relatively small. However, a change in use of the environment for recreation was by far the greatest producer of attitude change among Salem respondents who held inaccurate or "no difference" air pollution perceptions. A 1% change in use of the environment would produce a 16% change in attitudes. The implication is clear. One way to sensitize respondents who hold inaccurate or "no difference" perceptions is to persuade them to use the environment more for recreation. Individuals who make greater use of the environment for recreation appear to hold more positive attitudes

---

[1/] I am indebted to Dr. Albert N. Halter, Professor of Agricultural Economics at Oregon State University, for suggesting this procecure and for completing the calculations.

toward air quality. In turn, they are able to more accurately compare visibility differences and may see the relatively clean air of their recreation area as an "escape" from the visibility restrictions they perceive at home.

There is little one can do to change the social influence of an individual. Thus, producing changes in attitude by changing the level of this exogenous variable would not be particularly effective for Eugene and Salem "accurate" respondents. But, for Salem "inaccurate" respondents, efforts to change attitudes toward air quality are likely to produce positive results. One has to find some way to persuade these people to spend more of their recreation hours out-of-doors away from their home and, perhaps, to spend more of their time on recreation activities.

Finally, the belief that air pollution is serious -- based on the individual's experience living or working in the community -- is a significant exogenous effect that appears to have a bearing on attitudes at all stages of the communication process. Beliefs based on experience may well provide a basis for the acceptance of one of several definitions of air pollution situations with which an individual may be confronted. It may be redundant to assert that the first step in improving air quality is for a community to recognize that it has a serious problem. It is, nonetheless, a truism to state that efforts to improve air quality are not likely to succeed without this recognition. A pre-condition for the establishment of a successful air pollution control program is that the citizens of an airshed recognize the scope and magnitude of the problem. This pre-condition is satisfied when they perceive odors and loss of visibility, for example, for what they are and in terms which they believe are important to them.

LITERATURE CITED

1. Gordon Allport and Leo F. Postman, "The Basic Psychology of Rumor," in Readings in Social Psychology, Eleanor E. Maccoby, T. M. Newcomb, and E. L. Hartley, eds., New York: Henry Holt, pp. 54-65, 1958.

2. E. Jackson Baur, "Opinion Change in a Public Controversy," Public Opinion Quarterly, Vol. 26, pp. 212-226, 1962.

3. Kenneth Boulding, "The Economics of the Coming Spaceship Earth" in Henry Jarrett, ed., Environmental Quality in a Growing Economy, Baltimore: The Johns Hopkins Press, 1966.

4. James E. Brinton and L. N. McKown, "Effects of Newspaper Reading on Knowledge and Attitude," Journalism Quarterly, Vol. 38, pp. 187-196, 1961.

5. Charles F. Cannell and James C. MacDonald, "The Impact of Health News on Attitudes and Behavior," Journalism Quarterly, Vol. 33, pp. 315-323, 1956.

6. Rachel Carson, Silent Spring, New York: Houghton Mifflin, 1962.

7. Census of Population, Advance Report, PC(VI) - 39, Oregon, U.S. Department of Commerce, Bureau of Census, December 1970.

8. James S. Coleman, Community Conflict, Glencoe, Ill. The Free Press, 1957.

9. Barry Commoner, Science and Survival, New York: Viking, 1967.

10. Lewis Coser, The Functions of Social Conflict, New York: The Free Press, 1956.

11. M. Jay Crowe, "Toward a 'Definitional Model' of Public Perceptions of Air Pollution," J. of the Air Pollution Control Association, Vol. 18, pp. 154-157, 1968.

12. Robert C. Davis, The Public Impact of Science in the Mass Media, Ann Arbor: Survey Research Center, University of Michigan, 1958.

13. Paul B. Downing, "Solving the Air Pollution Problem: A Social Scientist's Perspective," Natural Resources Journal, Vol. II, pp. 693-713, 1971.

14. Jacob J. Feldman, The Dissemination of Health Information, Chicago: Aldine, 1966.

15. Raymond L. Gordon, "Interaction Between Attitude and the Definition of the Situation in the Expression of Opinion," American Sociological Review, Vol. 17, pp. 50-58, 1952.

16. Harold Guliksen, Theory of Mental Tests, New York: Wiley, 1950.

17. J. R. Hardison, "Status of Field Burning and Alternative Methods for Disease Control in Perennial Grasses," in R. M. Alexander, ed., Agricultural Field Burning in the Willamette Valley, Corvallis, Oregon: Air Resources Center, Oregon State University, pp. 18-24, 1969.

18. Paul Horst, Psychological Measurement and Prediction, Belmont, Calif.: Wadsworth, 1966.

19. Carl I. Hovland, "Reconciling Conflicting Results from Experimental and Survey Studies of Attitude Change," The American Psychologist, Vol. 14, pp. 3-14, 1959.

20. Hans Huth, Nature and the American: Three Centuries of Changing Attitudes, Berkeley, Calif.: University of California Press, 1957.

21. Herbert H. Hyman and Paul B. Sheatsley, "Some Reasons Why Information Campaigns Fail," Public Opinion Quarterly, Vol. 11, pp. 413-423, 1947.

22. J. Johnston, Econometric Methods, New York: McGraw-Hill, 1963.

23. V. O. Key Jr., Public Opinion and American Democracy, New York: A. A. Knopf, 1961.

24. Joseph T. Klapper, The Effects of Mass Communication, Glencoe, Ill.: The Free Press, 1961.

25. Jerome M. Levine and Gardner Murphy, "The Learning and Forgetting of Controversial Material," J. of Abnormal and Social Psychology, Vol. 38, pp. 507-517, 1943.

26. Robert G. Mason, Selection of Items for an Air Pollution Knowledge Test, Corvallis, Oregon: Special Report 324, Agricultural Experiment Station, Oregon State University, 1971.

27. Peter McHugh, Defining the Situation, New York: Bobbs-Merrill, 1968.

28. Jack M. McLeod and James W. Swinehart, *Satellites, Science and the Public: A Report of a National Survey on the Public Impact of Early Satellite Launchings*, Ann Arbor: Survey Research Center, University of Michigan, 1959.

29. Nahum Z. Medalia, *Community Perception of Air Quality: An Opinion Survey of Clarkston, Washington*, Cincinnati: Environmental Health Service, U. S. Department of Health, Education, and Welfare, 1965.

30. Willis E. Middlemiss and Robert O. Coppedge, *Oregon's Grass and Legume Seed Industry in Economic Perspective*, Corvallis, Oregon: Special Report 284, Cooperative Extension Service, Oregon State University, 1970.

31. W. E. K. Middleton, *Vision Through the Atmosphere*, Toronto: University of Toronto Press, 1952.

32. Roderick Nash, *Wilderness and the American Mind*, New Haven: Yale University Press, 1967.

33. Jum Nunnally, *Popular Conceptions of Mental Health*, New York: Henry Holt, 1961.

34. ______________, "Experimental Studies of Communicative Effectiveness," in Wilbur Schramm, ed., *Studies of Innovation and Communication to the Public*, Stanford: Institute for Communication Research, Stanford University, pp. 175-202, 1961.

35. Clarice N. Olein, *et al.*, "The Community Editor's Power and the Reporting of Conflict," *Journalism Quarterly*, Vol. 45, pp. 243-252, 1968.

36. Bernard Ostle, *Statistics in Research*, Ames, Iowa: The Iowa State University Press, 1963.

37. Elmer Robinson, "Effects of the Physical Properties of the Atmosphere," in A. C. Stern, ed., *Air Pollution*, New York: Academic Press, Vol. I, pp. 349-400, 1968.

38. Merrill E. Samuelson, *et al.*, "Education, Available Time and Mass Media Use," *Journalism Quarterly*, Vol. 40, pp. 491-496, 1963.

39. Thomas J. Scheff, "Toward a Sociological Model of Consensus," *American Sociological Review*, Vol. 32, pp. 32-46, 1967.

40. Wilbur Schramm, "Science News and the Public Mind," in Wilbur Schramm, ed., Studies of Innovation and of Communication to the Public, Stanford: Institute for Communication Research, Stanford University, pp. 261-286, 1962.

41. Jean J. Schueneman, "Air Pollution Control Administration," in A. C. Stern, ed., Air Pollution, New York: Academic Press, Vol. III, pp. 719-795, 1968.

42. Muzafer Sherif and Carolyn W. Sherif, An Outline of Social Psychology. New York: Hapers, 1956.

43. George W. Snedecor, Statistical Methods, Ames, Iowa: The Iowa State College Press, 4th edition, 1946

44. Shirley A. Star and Helen MacGill Hughes, "Report on an Educational Campaign: The Cincinnati Plan for the United Nations," American J. of Sociology, Vol. 55, pp. 389-400, 1950.

45. Robert A. Stebbins, "A Theory of the Definition of the Situation," The Canadian Review of Sociology and Anthropology, Vol. 4, pp. 148-164, 1967.

46. Arthur C. Stern, "Air Pollution Standards," in A. C. Stern, ed., Air Pollution, New York: Academic Press, Vol. III, pp. 601-720, 1968.

47. The Quality of Outdoor Recreation: As Evidenced by User Satisfaction, Report to the Outdoor Recreation Resources Review Commission, Study Report 5, Washington: U. S. Government Printing Office, 1965.

48. The Roper Report, New York: The Roper Organization, Inc., March 1972.

49. W. I. Thomas, The Child in America, New York: A. A. Knopf, 1928.

50. Phillip Tichenor, Communication and Knowledge of Science in the Adult Population of the U. S., unpublished Ph. D. Dissertation, Stanford University, 1965.

51. P. J. Tichenor, et al., "Mass Media Flow and Differential Growth in Knowledge," Public Opinion Quarterly, Vol. 34, pp. 159-170, 1970.

52. P. J. Tichenor, et al., "Environment and Public Opinion," The J. of Environmental Education, Vol. 2, pp. 38-42, 1971.

53. Stefan Valvanis, *Econometrics*, New York: McGraw-Hill, 1959.

54. R. B. Zajonc, "Attitudinal Effects of Mere Exposure," *J. of Personality and Social Psychology Monograph Supplement*, Vol. 9, Part 2, 1968.

APPENDICES

APPENDIX A

Review of Literature

Few propositions are as widely accepted as the one which claims a relationship between the attitudes people have toward some object and the knowledge they possess about it. Such a relationship is assumed in any attempt to create, reinforce or convert attitudes by the dissemination of factual information. It is in this context that a review of literature will provide much in the way of a foundation to support the theoretical model. The review will consider first the postulated relationships of variables in the interdependent system, then the postulated relationships of the predictor variables.

Effects of the Interdependent System

Attitudes. The role of attitudes and attitude change in predicting levels or changes in exposure and knowledge has been studied in several areas. Tichenor [50], in his re-analysis of the effect of a "threat of science" attitude scales on science knowledge, found that people with lower science knowledge scores perceived science as more "threatening". Nunnally [33, 34], utilizing laboratory experiments, discovered that it is relatively easy to convey new information about mental illness. Any seemingly authoritative and comprehensible information will be accepted by the public. Attitudes are more difficult to change, but they can be changed. Public anxiety over mental illness concepts is one of the facets affecting attitude change toward this topic. If anxiety-producing features of the message are not diminished, adverse attitude toward the topic develops and a premature closure of information that may be relevant follows. Acquiring information, regardless of its validity, often tends to reduce fear that may be built up about mental illness. Thus, the mere act of acquiring information leads to "constructive" attitude change. Conversely, when information is invalidated -- through counterargument by scientific authority, for example -- anxiety about the topic tends to increase. He concludes that it may be unwise to invalidate existing public misinformation unless a valid and understandable body of knowledge can be given in return.

Mass Media Exposure. Schramm [40] considers use of the mass media to be an important predictor of scientific information; after school years, most of the increment in science knowledge comes from the mass media. Amount of exposure to the mass media is often used to predict science knowledge, with or without controlling for predisposition effects, such as level of education. Brinton and McKown [4] found that newspaper subscribers differed significantly from non-subscribers in knowledge concerning fluoridation of a public water supply, at a time and in an area marked by a dispute over this issue. They concluded that a high degree of personal involvement in an issue and a perceived need for information are not necessary for a person to expose himself to relevant messages in the mass media.

McLeod and Swinehart [28] have found that media exposure was related to level of science information. Their 1958 (post-Sputnik) study showed that mass media exposure was closely linked to attribution of a scientific purpose to satellites, even with the effect of education controlled. Since the two variables (education and exposure) were independent predictors, this provided evidence that mass media exposure may be viewed as a distinct effect and not merely an artifact of education.

Davis [12] was able to describe the amount and kind of media used after controlling for level of science knowledge. He found that highly informed people were heavy users of the mass media, used more forms of the print media (newspapers, books, magazines, etc.) and used them more intensely than those less informed. Attention to the electronic media was less clear-cut. Better informed persons were more likely than the less informed to be in the radio and television audience, but they spent less total time with these mediums. The most extensive attention to radio and television was among the less informed. In a comprehensive survey on the dissemination of health information, Feldman [14] has noted that better informed individuals were also newspaper and magazine readers, and constituted a ready audience for the health educator.

Science knowledge can affect mass media exposure and the question of whether knowledge precedes or follows exposure -- or both -- is often unresolved. Studies of selective processes have frequently suggested that persons with higher interest and prior knowledge are more likely to expose themselves to sources of information to gain even more knowledge. For example, Hyman and Sheatsley [21] report that persons showing high interest in the atomic bomb were more than twice as likely as uninterested persons to report having been exposed to information about an early atomic energy report. Selective processes also work to "screen out" threatening messages from the individual's perceived environment. Illustrative of this process are the findings of Cannell and MacDonald [5]. They discovered that readership of articles on health -- particularly those dealing with the possible relationship between smoking and cancer -- were consistently read by 60 percent of the non-smoking males but by only 32 percent of the smoking males to whom the information presented was more of a threat. Among women, for whom the threat was considerably less, they found that the respective readership percentages were 69 and 59.

Knowledge. A widely recognized tenet of social psychology is that people tend to select and retain information which is consistent with their prior attitudes. Messages which conflict with established attitudes are often misperceived, distorted or ignored in order to "fit" with the pre-existing attitudes. Illustrative of this principle is the Allport and Postman [1] study on rumor transmission. Persons who were shown a picture of a white man and a Negro arguing, with the white man holding a knife, later reported that the Negro was wielding the knife, consistent with their prior attitude toward Negroes. Levine and Murphy [25] presented pro- and anti-Communist statements to students. Afterwards, students tended to recall only information consistent with their prior attitudes: Pro-Communists were more likely to remember pro-Communist information, and *vice-versa*. Star and

Hughes [44], noting a failure of a massive information campaign in Cincinnati to increase level of information concerning the United Nations, concluded that any increase in exposure was determined largely by peoples' previous orientation. Interest and prior knowledge determined who would attend the information campaign and those who attended were relatively unaffected by the campaign itself. Thus, what one knows about a subject often can serve as a predictor of his attitude about the subject. Tichenor [50] has supported this in two respects. He found that general science knowledge was related to three attitudinal items that were combined into an index of "threat of science". It was noted earlier that those who had lower science knowledge scores perceived science as more "threatening", i. e., fear that science may mean control by a few over many, concern for science-caused rapid changes and the belief that science tends to break down moral ideas. In addition, he reported that persons with lower science knowledge scores tend to hold negative attitudes toward science. This pattern held at all levels of education and was not associated with level of exposure to science information in the mass media.

Proposed changes in the environment, however, have formed attitudes among individuals who perceived that they might affect the outcome of these changes. In his study of a local controversy concerning alternative methods of flood control and water conservation, Baur [2] found that attitudes were formed, in part, through subtle changes in kinds of knowledge about the issue.

Effect of Predictors

Level of Exposure to Interpersonal Information Sources. Exposure to interpersonal discussion, mass media use and level of knowledge may complement each other in forming or reinforcing attitudes toward air quality. Information reaching individuals via the mass media is considered susceptible to the mediation of other people, as Klapper [24] has noted. Moreover, Baur [2], in his study of attitude formation and change in a public controversy, concluded that opinions emerged and were changed primarily through interpersonal communication, although changes were initiated by formal organizations and projected by the mass media. Level of interpersonal discussion is considered a predictor of attitude.

Experience with Air Pollution. Experience refers to the level of participation or living in an area in which a known deterioration in air quality has occurred. It is considered a basis for both attitude formation toward, and knowledge about, air quality. Medalia [29], for example, has reported that length of residence in Clarkston, Washington, (an area subjected to continuous pollution from a kraft pulp mill) was strongly related to concern with air pollution. Approximately two-thirds of the persons interviewed who had lived in Clarkston in 1950 or before were highly disturbed by air pollution as a problem, compared to a little over a third of those who had moved to the city in 1951 or later.

Level of Social Influence. People differ in their level of social influence, and a well-established proposition concerning the behavior of influentials is their level of exposure to the mass media, particularly the printed word. Those high in influence tend to expose themselves to pertinent forms of the mass media compared to those less influential, according to Klapper [24]. Level of social influence is considered a predictor for level of mass media exposure.

Level of Education. Satisfactory completion of successive years of education provides a person with greater knowledge and skills. The knowledge acquired, of whatever quality, can only expand a person's total world of actuality and reality. Each increment of schooling adds to his competence through the acquisition of knowledge and incidental skills. Further, advancement into college or university training is taken to reflect the potential of better performance, compared to others who are screened from higher education. The reading skills learned have important consequences in later life for increased exposure to the mass media, particularly the printed word. This fact has been well documented by many communication studies (*e.g.*, Samuelson, et al. [38]). In turn, it is not at all surprising to find, as Schramm [40] has reported and as Tichenor [50] has confirmed, that an individual's level of education is the chief predictor of his level of exposure to science information in the mass media and his amount of science knowledge.

Level of Science Education. Level of formal education may not be the whole story. It is conceivable that high school or college graduates -- with no formal science education -- may not acquire the vocabulary and content necessary to evaluate and comprehend science to the same extent as those who have completed some formal science courses. In his secondary analysis, Tichenor [50] reported that the amount of science education in high school or college also may be an important predictor of science knowledge. These attributes were strikingly low for high school and college-educated individuals with no formal science course work,

Level of the Use of the Environment. People differ in the percent of time they spend outdoors and individuals who are outdoors much of their daylight hours may have a greater opportunity to differentiate and evaluate the air quality of where they live, compared to those who are outdoors little, if any. This may be particularly true in the realm of outdoor recreation use. Air quality plays a role in the preference people have for outdoor recreation, according to a report of the Outdoor Recreation Resources Review Commission [47]. Deterioration in air quality was one of the reasons cited for recreation-user dissatisfaction. Thus, it appears that the quality of the environment is an important aspect for sustained outdoor recreation use, and the level of outdoor use may be a predictor of knowledge toward air quality.

APPENDIX B

Interview Schedules A and B

APPENDIX B. Interview Schedule A

Budget Bureau Number 85-S70010
Approval Expires March 31, 1971

Schedule A

OREGON STATE UNIVERSITY

Final

Hello, I'm working on a survey for Oregon State University and I would like to ask you a few interesting questions, if you don't mind.

1 -	_____ Years X DK, NA	First, how many years have you, yourself, lived in the Salem (Eugene) Metropolitan Area?
2 -	4 Own 3 Rent 2 Other _______ 1 DK, NA	May I ask whether you own or rent the place in which you are now living?
3 -	_____ Years	Approximately how long have you lived in this particular dwelling unit?
4 -	3 Yes 2 No 1 DK, NA	Some people plan to move within six months to a year, while others plan to stay put in the same home or apartment. How about you -- do you have any plans to move to another place within, say, the next six months?

NOTE TO INTERVIEWER: If respondent answers "Yes" to Q 4 or Rents and has lived in current DU less than one year, terminate the interview.

(ASK OF EVERYONE)

5 -	2 Yes - Asked 1 No or DK	Looking back over the past few months, can you remember any time someone outside your immediate family has asked your opinion about state or community affairs?
6 -	3 Convince 2 Active part 1 Listen or DK	When a discussion is on about community affairs, do you usually listen, take an active part, or try to convince others especially?
7 -	4 A lot 3 Quite a bit 2 Little 1 None 0 DK, NA	Some people earn all or part of their living by working outdoors, while others' jobs keep them inside. How about your family? About how much time, if any, did the chief breadwinner spend working outdoors for pay last year -- a lot, quite a bit, a little, or none at all?
8 -	4 A lot 3 Quite a bit 2 A little 1 None 0 DK, NA	Some people spend quite a bit of time out-of-doors while others have other pastimes. Not counting work for pay, how much time, if any, did you, yourself, spend out-of-doors last year -- none at all, a little, quite a bit, or a lot?

Now, here are some specific out-of-door activities. After I read each one, will you please tell me how much time, if any, you spent participating in that activity during the past twelve months -- a lot, quite a bit, a little, or none at all?

	Lot	Quite bit	Little	None	DK, NA	Activity
9 -	4	3	2	1	0	Bicycling
10 -	4	3	2	1	0	Attending outdoor cultural events
11 -	4	3	2	1	0	Gardening
12 -	4	3	2	1	0	Picnicking
13 -	4	3	2	1	0	Camping
14 -	4	3	2	1	0	Pleasure driving, sightseeing
15 -	4	3	2	1	0	Boating or water skiing
16 -	4	3	2	1	0	Horseback riding
17 -	4	3	2	1	0	Hunting
18 -	4	3	2	1	0	Attending outdoor sporting events
19 -	4	3	2	1	0	Playing golf
20 -	4	3	2	1	0	Ocean beach activities
21 -	4	3	2	1	0	Walking for pleasure, hiking, nature study, rockhounding, etc.
22 -	4	3	2	1	0	Swimming
23 -	4	3	2	1	0	Fishing
24 -	4	3	2	1	0	Playing outdoor games and sports
25 -	4	3	2	1	0	Other ______ (Specify)

26 - Suppose one of your friends came to you and asked you how he could find out what is known about air pollution. Where would you advise him to go for that information? (PROBE for both someone to talk to and something to read)

Anything else?

27 - Do you feel you personally know more or less about air pollution than most people? (PROBE!)

Anything else?

---

28 - Where do you feel that you, yourself, have gotten the most valuable information about air pollution? (PROBE!)

Anything else?

29 -	1 Oregon Statesman (R-G) 2 Capital Journal 3 Other______ 4 None 5 DK, NA	What daily newspaper, or newspapers, if any, came into your home yesterday?
30 -	1 Press (Reminder) 2 Other ______ 3 Other ______ 4 None 5 DK, NA	What weekly newspaper, or newspapers, if any, came into your home last week?
31 -	_____ Number	Not counting car radios, how many radios, if any, do you have in your home?
32 -	_____ Number	And, how many TV sets, if any, do you have in your home?
33 -	______________ ______________ ______________ ______________ 0 None	Which magazines or publications, if any, came into your home this past month? Any others?

27 - Do you feel you personally know more or less about air pollution than most people? (PROBE!)

Anything else?

---

28 - Where do you feel that you, yourself, have gotten the most valuable information about air pollution? (PROBE!)

Anything else?

29 -	1 Oregon Statesman (R-G) 2 Capital Journal 3 Other__________ 4 None 5 DK, NA	What daily newspaper, or newspapers, if any, came into your home yesterday?
30 -	1 Press (Reminder) 2 Other __________ 3 Other __________ 4 None 5 DK, NA	What weekly newspaper, or newspapers, if any, came into your home last week?
31 -	_____ Number	Not counting car radios, how many radios, if any, do you have in your home?
32 -	_____ Number	And, how many TV sets, if any, do you have in your home?
33 -	____________________ ____________________ ____________________ ____________________ 0 None	Which magazines or publications, if any, came into your home this past month? Any others?

34 - Listed on this card are several sources that many people use to obtain information. From which one of these sources do you believe you get most of your information about air pollution? (HAND RESPONDENT CARD A) Which is second most in importance? Which is least in importance?

Most	Next	Least
1 Newspaper	1 Newspaper	1 Newspaper
2 Magazine	2 Magazine	2 Magazine
3 Radio	3 Radio	3 Radio
4 Television	4 Television	4 Television
5 Other ________	5 Other ________	5 Other ________
6 DK, NA	6 DK, NA	6 DK, NA

I have a list of statements here concerning different sources of information about air pollution. As I read each one, will you please tell me what you know or how you feel about them?

	Lot, Very	Quite, Quite	Little, Not too	Nothing, Never	DK	
35 -	4	3	2	1	0	How much have you talked to someone at Willamette University (Univ. of Oregon) or Oregon State about air pollution -- not at all, a little, quite a bit, or a lot?
36 -	4	3	2	1	0	How much have you viewed on TV about air pollution -- a lot, quite a bit, a little, or nothing?
37 -	4	3	2	1	0	How often have you talked to someone at the state or local Air Pollution Control Authority about air pollution -- never, not too often, quite often, or very often?
38 -	4	3	2	1	0	How much have you read in the newspaper about air pollution -- nothing, a little, quite a bit, or a lot?
39 -	4	3	2	1	0	How often have you discussed air pollution with your neighbors -- very often, quite often, not too often, or never?
40 -	4	3	2	1	0	How often have you listened to something about air pollution over the radio -- never, a little, quite a bit, or a lot?
41 -	4	3	2	1	0	How much have you talked to your friends about air pollution -- a lot, quite a bit, a little, or never?
42 -	4	3	2	1	0	How much have you read in a magazine about air pollution -- nothing, a little, quite a bit, or a lot?

(ASK OF EVERYONE)

43 - 2 Yes (Where? ____________) 3 Yes (Where? ____________) 4 Yes (Where? ____________) 1 No (Skip to Q 46) 0 DK, NA (Skip to Q 46)	Within the past five years, have you lived in any state or states other than Oregon where you felt there was an air pollution problem while you were living there?

(IF YES IN Q 43, ASK FOR EACH AREA)

44 - How serious did you consider their air pollution problem to be -- not too serious, somewhat serious, or very serious?

Area(s)	____________	____________	____________
	4 Very serious	4 Very serious	4 Very serious
	3 Somewhat	3 Somewhat	3 Somewhat
	2 Not too	2 Not too	2 Not too
	1 DK, NA	1 DK, NA	1 DK, NA

---

45 - What type or types of air pollution was there in this (these) area(s) where you used to live -- just describe it in your own words? (PROBE!)

(INT: Write in area(s) with response opposite)

Area: Response

Area: Response

Area: Response

(ASK OF EVERYONE)

46 - Within the past five years, have you visited any state or states other than Oregon where you felt there was an air pollution problem while you were visiting there?

2 Yes (Where? ______________)
3 Yes (Where? ______________)
4 Yes (Where? ______________)
1 No (Skip to Q 49)
0 DK, NA (Skip to Q 49)

(IF YES IN Q 46, ASK FOR EACH AREA)

47 - How serious did you consider their air pollution problem to be -- very serious, somewhat serious, or not too serious?

Area(s) ______________ ______________ ______________

4 Very serious	4 Very serious	4 Very serious
3 Somewhat	3 Somewhat	3 Somewhat
2 Not too	2 Not too	2 Not too
1 DK, NA	1 DK, NA	1 DK, NA

48 - What type or types of air pollution was there in this (these) area(s) where you visited -- just describe it in your own words? (PROBE!)

(INT: Write in area(s) with response opposite)

Area: Response

Area: Response

Area: Response

(ASK OF EVERYONE)

49 - Within the past five years, have you lived in any community or communities in Oregon other than the one you live in now where you felt there was an air pollution problem while you were living there?

2 Yes (Where? ____________)
3 Yes (Where? ____________)
4 Yes (Where? ____________)
1 No (Skip to Q 52)
0 DK, NA (Skip to Q 52)

(IF YES IN Q 49, ASK FOR EACH AREA)

50 - How serious did you consider their air pollution problem to be -- very serious, somewhat serious, or not too serious?

Area(s) ____________ ____________ ____________

4 Very serious	4 Very serious	4 Very serious
3 Somewhat	3 Somewhat	3 Somewhat
2 Not too	2 Not too	2 Not too
1 DK, NA	1 DK, NA	1 DK, NA

---

51 - What type or types of air pollution was there in this (these) area(s) where you lived -- just describe it in your own words? (PROBE!)

(INT: Write in area(s) with response opposite)

Area: Response

Area: Response

Area: Response

(ASK OF EVERYONE)

52 -
2 Yes (Where? ________________)
3 Yes (Where? ________________)
4 Yes (Where? ________________)
1 No (Skip to Q 55)
0 DK, NA (Skip to Q 55)

Within the past five years, have you visited any part or parts of Oregon where you felt there was an air pollution problem while you were visiting there?

(IF YES IN Q 52, ASK FOR EACH AREA)

53 - How serious did you consider their air pollution problem to be -- not too serious, somewhat serious, or very serious?

Area(s) ________________ ________________ ________________

4 Very serious	4 Very serious	4 Very serious
3 Somewhat	3 Somewhat	3 Somewhat
2 Not too	3 Not too	2 Not too
1 DK, NA	1 DK, NA	1 DK, NA

54 - What type or types of air pollution was there in this (these) area(s) where you visited -- just describe it in your own words? (PROBE!)

(INT: Write in area(s) with response opposite)

Area: Response

Area: Response

Area: Response

(ASK OF EVERYONE)

55 - 2 Yes
1 No (Skip to Q 58)
0 DK, NA (Skip to Q 58)

Now, thinking of the area within a mile of where you now live in Oregon, do you feel that there is an air pollution problem in this area?

(IF YES IN Q 55)

56 - 4 Very serious
3 Somewhat
2 Not too
1 DK, NA

How serious do you consider this air pollution problem within a mile of where you now live -- very serious, somewhat serious, or not too serious?

57 - What type, or types, of air pollution problems do you have in this area where you now live -- just describe them in your own words? (PROBE!)

(ASK OF EVERYONE)

Here are some statements that have been made recently about air pollution. As I read each one, would you please tell me how strongly you agree or disagree with it? (HAND RESPONDENT LIST OF Q's 58-77)

	Agree strongly	Agree	No opinion	Disagree	Disagree strongly	DK, NA	Statement
58 -	1	2	3	4	5	0	We don't have to worry about air pollution here. The problem will solve itself.
59 -	5	4	3	2	1	0	People must be ready to pay increased taxes, utility rates, and higher prices on consumer goods if we are to have clean air again.
60 -	5	4	3	2	1	0	As a good place to live, the Willamette Valley is deteriorating from air pollution year by year.
61 -	5	4	3	2	1	0	More public support is needed for air pollution control programs.

	Agree strongly	Agree	No opinion	Disagree	Disagree strongly	DK, NA	Statement
62 -	5	4	3	2	1	0	Unless the sources of air pollution are controlled, Oregon's landscapes will be blighted and the health of its residents endangered.
63 -	5	4	3	2	1	0	Air pollution is a subject that everyone talks about but does little or nothing about.
64 -	1	2	3	4	5	0	Farmers have to make a living, and if they have to burn their fields, fine.
65 -	1	2	3	4	5	0	We should continue to exempt certain industries from air pollution control laws even if these industries pollute the air at certain times of the year.
66 -	5	4	3	2	1	0	I believe that values drop for properties downwind from a Kraft paper plant.
67 -	5	4	3	2	1	0	Any company or industry should make an effort to control its air pollution as a matter of good business.
68 -	5	4	3	2	1	0	I would be willing to pay more dollars in taxes for universities to engage in more air pollution control research.
69 -	1	2	3	4	5	0	Air pollution will never be controlled in the sense of being finally and totally eliminated.
70 -	5	4	3	2	1	0	We pay hidden costs of air pollution by visiting our physician more frequently, through decreased land values, and by more frequent painting of our houses and more frequent cleaning of our clothing.
71 -	1	2	3	4	5	0	Until some other way is discovered to take care of the farmers' grass seed straw without burning, we will just have to put up with air pollution.
72 -	5	4	3	2	1	0	We must spend a lot more money than we are now to clean up our air.
73 -	1	2	3	4	5	0	We should do nothing to control air pollution as long as the slightest doubt remains about the effects of air pollution on human health.

	Agree strongly	Agree	No opinion	Disagree	Disagree strongly	DK, NA	Statement
74 -	5	4	3	2	1	0	Air pollution produced by Kraft paper mills stinks.
75 -	1	2	3	4	5	0	I don't feel that air pollution has any effect on the economy of this community.
76 -	1	2	3	4	5	0	While sources of air pollution may be environmental villains, they are also social and economic necessities.
77 -	5	4	3	2	1	0	Most industries won't do anything about controlling their air pollution unless they are forced to.

78 - Are you, yourself, presently a member of any of the following kinds of organizations? (HAND RESPONDENT CARD C)

1 Farm group
2 Lodge or fraternal order
3 Church social or service group
4 Labor union
5 Civic or service club
6 Political group
7 PTA
8 Occupational or businessmen's group
9 Social club
0 Conservation, environmental or clean-air group
+ Other ____________________ (Specify)
- None (Skip to Q 85)

79 - What are the names of the groups to which you, yourself, belong? (NOTE: List specific names of groups circled in Q 78)

____

____

____

80 - About how many times a year does this group meet? (Exc. Sun. at Church)

____

____

____

81 - About how many times did you attend last year?

____

____

____

82 - Have you held an office in any of the groups to which you belong?

2 Yes (What group?) ____________
1 No, DK, NA

83 - How long ago did you hold office in the group?

____
____
____

---

84 - Do you feel that membership in any of the groups to which you belong helps you obtain valuable information about air pollution?

1 Yes (Ask Q 84a)
2 No (Skip to Q 85)
3 DK (Skip to Q 85)

84a - (IF YES) Which group or groups do you feel provide you with valuable information about air pollution?

____
____
____

84b - (IF MORE THAN ONE GROUP MENTIONED IN Q 84a) Which one group do you feel you received the most valuable air pollution information from?

____
0 DK

(ASK OF EVERYONE)

I have here another list of statements that have been made lately about air pollution. As I read each one, would you please tell me quickly if you think they are true or false? (HAND RESPONDENT LIST OF Q's 85-104)

	True	False	NA, DK	Statement
85 -	1	0	-	Persons who suffer from respiratory ailments, such as asthma, emphysema and bronchitis, are particularly affected by air pollution.
86 -	0	1	-	Jet airplane engines might destroy enough ozone to permit a harmful increase in ultraviolet light reaching the Earth.
87 -	0	1	-	A physician can measure the amount of air pollution by examining heart and lung functions of some of his patients.
88 -	1	0	-	Areas of Oregon not included in the regional air pollution control authorities will be under the jurisdiction of the Oregon Environmental Quality Commission.
89 -	0	1	-	Education and quiet persuasion have usually proved to be better tools than rigid abatement proceedings in waging the war against air pollution.

	True	False	NA, DK	Statement
90 -	0	1	-	Forest slash burning does not produce the same kind of smoke that agricultural field burning produces.
91 -	1	0	-	Sunlight causes hydrocarbons to combine with oxides of nitrogen to produce photochemical smog.
92 -	1	0	-	Air pollution affects visibility.
93 -	1	0	-	Carbon monoxide is one type of an air pollutant emitted by automobiles.
94 -	1	0	-	The U. S. has both the technology and the wealth to drastically reduce air pollution.
95 -	0	1	-	About half the states have air pollution control laws.
96 -	1	0	-	Carbon monoxide reduces the oxygen-carrying capacity of the blood.
97 -	0	1	-	Air pollution in the Willamette Valley of Oregon is as bad as the air pollution in Los Angeles.
98 -	1	0	-	Foreign cars sold in the U. S. will have to carry new anti-pollution equipment required by Federal standards.
99 -	0	1	-	While Kraft mill air pollutants may have an unpleasant odor, they are not harmful to human health.
100 -	0	1	-	The atmosphere cannot be cleansed once it is polluted.
101 -	0	1	-	There is no way of knowing the amount of pollutants emitted into the air from automobile exhausts.
102 -	1	0	-	Dust storms and sand storms, forest fires, earthquakes, landslides, and windborne pollens are ways nature pollutes the air.
103 -	0	1	-	Smoke in the air does not aggravate asthma or upper respiratory trouble.
104 -	1	0	-	Fine particles of lead are emitted as air pollution by automobiles.
105 -	2 Yes - asked 1 No or DK			Looking back over the past few months, can you remember any time someone outside your immediate family has asked your opinion about air pollution?

106 -	3 Convince 2 Active part 1 Listen or DK	When a discussion is on about air pollution, do you usually listen, take an active part, or try to convince others especially?
107 -	2 Yes 1 No or DK	Do you happen to know any political office holder in the state personally?
108 -	4 College - complete 3 College - partial 2 High school 1 Grade or no schooling	Would you mind telling me the last grade you completed in school?

109 - (IF RESPONDENT WENT TO HIGH SCHOOL OR BEYOND) Would you tell me what science or mathematics courses, if any, you took in high school (and college). As I read each one will you tell me whether or not you took them?

H.S.	College	Didn't take	Mathematics
1	2	0	Algebra
1	2	0	Geometry
1	2	0	Trigonometry
1	2	0	Calculus
1	2	0	Statistics
1	2	0	Other ____________ (Specify)

			Science
1	2	0	General science
1	2	0	Biology
1	2	0	Chemistry
1	2	0	Physics
1	2	0	Geology
1	2	0	Botany
1	2	0	Astronomy
1	2	0	Zoology
1	2	0	Microbiology
1	2	0	Other ____________ (Specify)

			Behavioral Science
1	2	0	Economics
1	2	0	Psychology
1	2	0	Sociology
1	2	0	Anthropology
1	2	0	Political science
1	2	0	Other ____________ (Specify)

110 -	____________ (Type of industry) ____________ (Specific job)	What type of work does the chief breadwinner in the family do?
111 -	1 20-29 2 30-39 3 40-49 4 50-59 5 60 & above	May I ask your approximate age?

BY OBSERVATION

112 -	1 Male 2 Female	
113 -	1 Less than 30 minutes 2 30 minutes - 1 hour 3 1 hour - 1½ hours 4 More than 1½ hours	Length of interview
114 -	3 Positive 2 Neutral 1 Negative	Rating on cooperation

X I hereby certify this interview was actually taken at the following address and represents a true and accurate account of the interview.

____________ (Address) ____________ (City) ____________ (Interviewer's Signature)

____________ Phone Number (For verification only) Name ____________

FOR OFFICE USE ONLY: Interview verified by ____________ Date ____________

APPENDIX B. Interview Schedule B

Budget Bureau Number 85-S70010
Approval Expires March 31, 1971

Schedule B

OREGON STATE UNIVERSITY

Final b

Hello, I'm __________, and I'm working on a research project for Oregon State University. May I ask if you are ______________. Thank you. As you may remember, you were kind enough to grant us an interview a short while ago on some interesting topics, one of which was air pollution. We'd like to ask you to grant us just a few more minutes of your time to get the benefit of some more of your reactions. As you can see, (show quex) this is much shorter than the first one and will only take a few minutes of your time. Your interview is so important to us since you are a vital part of our cross-section, and you will be doing the University a great favor.

The results are tabulated for the area as a whole, not for any one person. Anything you say will be held in the strictest confidence.

(ASK OF EVERYONE)

Here are some statements that have been made recently about air pollution. As I read each one, would you please tell me how strongly you agree or disagree with it? (HAND RESPONDENT LIST OF Q's 1 - 20)

	Agree strongly	Agree	No opinion	Disagree	Disagree strongly	DK, NA	Statement
1 -	5	4	3	2	1	0	No individual or industry has a right to pollute the air.
2 -	1	2	3	4	5	0	People are too hysterical these days about air pollution.
3 -	1	2	3	4	5	0	Business and industry should be given a chance to solve their air pollution problems before the government moves in.
4 -	1	2	3	4	5	0	Smoke and odors from stacks mean industry. Industry means jobs and jobs mean purchasing power and trade.
5 -	5	4	3	2	1	0	Too much air pollution in the Willamette Valley will prevent other cleaner industries from locating here.
6 -	5	4	3	2	1	0	Pollution control must be a community effort.
7 -	5	4	3	2	1	0	Politics are necessary to obtain clean air.
8 -	5	4	3	2	1	0	Anyone in our area can see that air pollution is marring a once beautiful scenic area.

	Agree strongly	Agree	No opinion	Disagree	Disagree strongly	DK, NA	Statement
9 -	5	4	3	2	1	0	Public opinion must be aroused before the next Oregon legislature will take firm steps to control our polluted air.
10 -	5	4	3	2	1	0	Each one of us is partly responsible for contributing to this area's air pollution problem.
11 -	1	2	3	4	5	0	You can't shut down industries which pollute the air because you would create an unemployment problem.
12 -	1	2	3	4	5	0	The field burning smoke problem in the Willamette Valley is the farmers' problem and no one else's.
13 -	1	2	3	4	5	0	Air pollution in this area does not affect me physically.
14 -	5	4	3	2	1	0	The fight against air pollution will be a losing one in Oregon until anti-pollution laws are made stronger.
15 -	5	4	3	2	1	0	Air pollution is such a threat that it might be compared to the threat of germ warfare.
16 -	5	4	3	2	1	0	It doesn't matter what it costs; pollution research is a job that has to be done.
17 -	5	4	3	2	1	0	We are bringing about our own destruction through the continued dirtying of our air.
18 -	5	4	3	2	1	0	If state and local governments fail to provide effective air quality standards, then the Federal government should set and enforce such standards.
19 -	1	2	3	4	5	0	Air pollution in Oregon is not as bad as it used to be.
20 -	1	2	3	4	5	0	Fining companies that pollute the air is not the answer to air pollution control.

I have a list of statements here concerning different sources of information about air pollution. As I read each one, will you please tell me what you know or how you feel about them?

	Lot, Very	Quite, Quite	Little, Not too	Nothing, Never	DK	
21 -	4	3	2	1	0	How much have you read in a magazine about air pollution -- a lot, quite a bit, a little, or nothing?
22 -	4	3	2	1	0	How much have you viewed on TV about air pollution -- nothing, a little, quite a bit, or a lot?
23 -	4	3	2	1	0	How often have you discussed air pollution with your neighbors -- never, not too often, quite often, or very often?
24 -	4	3	2	1	0	How often have you talked to someone at the state or local Air Pollution Control Authority about air pollution -- very often, quite often, not too often, or never?
25 -	4	3	2	1	0	How often have you listened to something about air pollution over the radio -- a lot, quite a bit, a little, or never?
26 -	4	3	2	1	0	How much have you talked to your friends about air pollution -- never, a little, quite a bit, or a lot?
27 -	4	3	2	1	0	How much have you read in the newspaper about air pollution -- a lot, quite a bit, a little, or nothing?
28 -	4	3	2	1	0	How much have you talked to someone at Willamette University (Univ. of Oregon) or Oregon State about air pollution -- a lot, quite a bit, a little, or not at all?

29 - Listed on this card are several sources that many people use to obtain information. From which one of these sources do you believe you get most of your information about air pollution? (HAND RESPONDENT CARD A) Which is second most in importance? Which is least in importance?

Most	Next	Least
1 Newspaper	1 Newspaper	1 Newspaper
2 Magazine	2 Magazine	2 Magazine
3 Radio	3 Radio	3 Radio
4 Television	4 Television	4 Television
5 Other ________	5 Other ________	5 Other ________
6 DK, NA	6 DK, NA	6 DK, NA

(ASK OF EVERYONE)

I have here another list of statements that have been made lately about air pollution. As I read each one, would you please tell me quickly if you think they are true or false? (HAND RESPONDENT LIST OF Q's 30 - 49)

	True	False	NA, DK	Statement
30 -	1	0	-	Agricultural field burning during the summer is a source of air pollution in the upper Willamette Valley of Oregon.
31 -	0	1	-	Scientific evidence is inconclusive that sulphur dioxide is a hazard to human health.
32 -	1	0	-	Air pollution emissions from industrial processes have damaged livestock, crops, fruit trees, and flowers.
33 -	1	0	-	Air pollutants fade fabrics.
34 -	0	1	-	The best known air pollution control devices still don't work effectively.
35 -	1	0	-	Some air pollution control devices earn profits for industry from the pollutants recovered from the air.
36 -	0	1	-	California is the only state trying to reduce automobile pollution through the installation of tail-pipe afterburners.
37 -	0	1	-	The great majority of Americans has never seen smog.
38 -	1	0	-	Many companies have waited until local authorities have forced them to control their air pollution emissions.
39 -	0	1	-	Sulfur oxides are known to cause cancer, though it takes higher concentrations than are usually found in the air.
40 -	1	0	-	Air pollution is irritating -- mentally as well as physically.
41 -	0	1	-	There is no scientific evidence that air pollution leads to emphysema, chronic bronchitis, or lung cancer.
42 -	0	1	-	There is as yet no definite medical evidence about the relationship between air pollution and human health.
43 -	1	0	-	There is an economic issue involved with air pollution control.

	True	False	NA, DK	Statement
44 -	0	1	-	Rain has no effect on temperature inversions.
45 -	1	0	-	Troublesome gaseous contaminants may pass through air conditioners unhindered.
46 -	0	1	-	Most devices for reducing auto exhaust fumes have been designed to fit on a car's tailpipe.
47 -	0	1	-	Sulphur dioxide cannot be controlled through devices on stacks.
48 -	1	0	-	Polluted air and dust can be carried for long distances by the wind before reaching the ground.
49 -	1	0	-	Pollution exists in two basic forms--particles and gases.

---

50 -	3 Better 2 Worse 1 No diff. (Skip to Q 53) 0 DK, NA "	Within the last three weeks, would you say that the air pollution in Salem (Eugene) is better or worse than when we talked to you earlier this year in May?
51 -	3 Lot 2 Somewhat 1 Little 0 DK, NA (Skip to Q 53)	How much (better) (worse) would you say the air pollution is in Salem (Eugene)--a lot, somewhat, or a little?

---

52 - How or in what way(s) would you say that the air pollution in Salem (Eugene) is(better) (worse) than when we talked to you last May? (PROBE!)

Anything else?

BY OBSERVATION

53 -	1 Male 2 Female	
54 -	1 Less than 30 minutes 2 30 minutes - 1 hour 3 1 hour - 1½ hours 4 More than 1½ hours	Length of interview
55 -	3 Positive 2 Neutral 1 Negative	Rating on cooperation

X I hereby certify this interview was actually taken at the following address and represents a true and accurate account of the interview.

_______________ (Address) _______________ (City) _______________ (Interviewer's Signature)

_______________ Phone Number (For verification only)

FOR OFFICE USE ONLY: Interview verified by _______________ Date _______________

APPENDIX C

Frequency Curves of Clean Air Themes
(Figures 9-22)

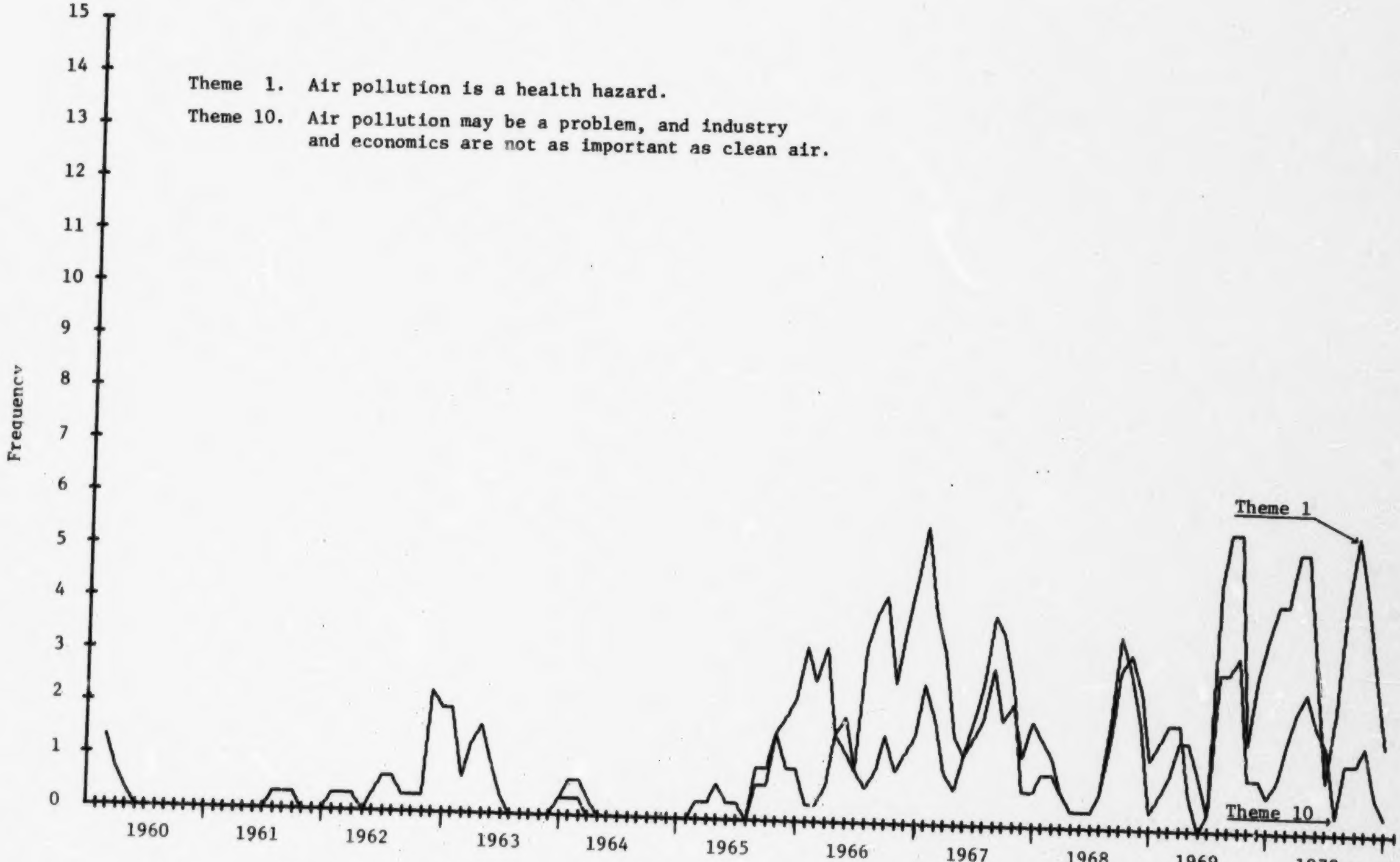


Figure 9. Frequency distribution of "for clean air" themes 1 and 10, Eugene, 1960-1970.

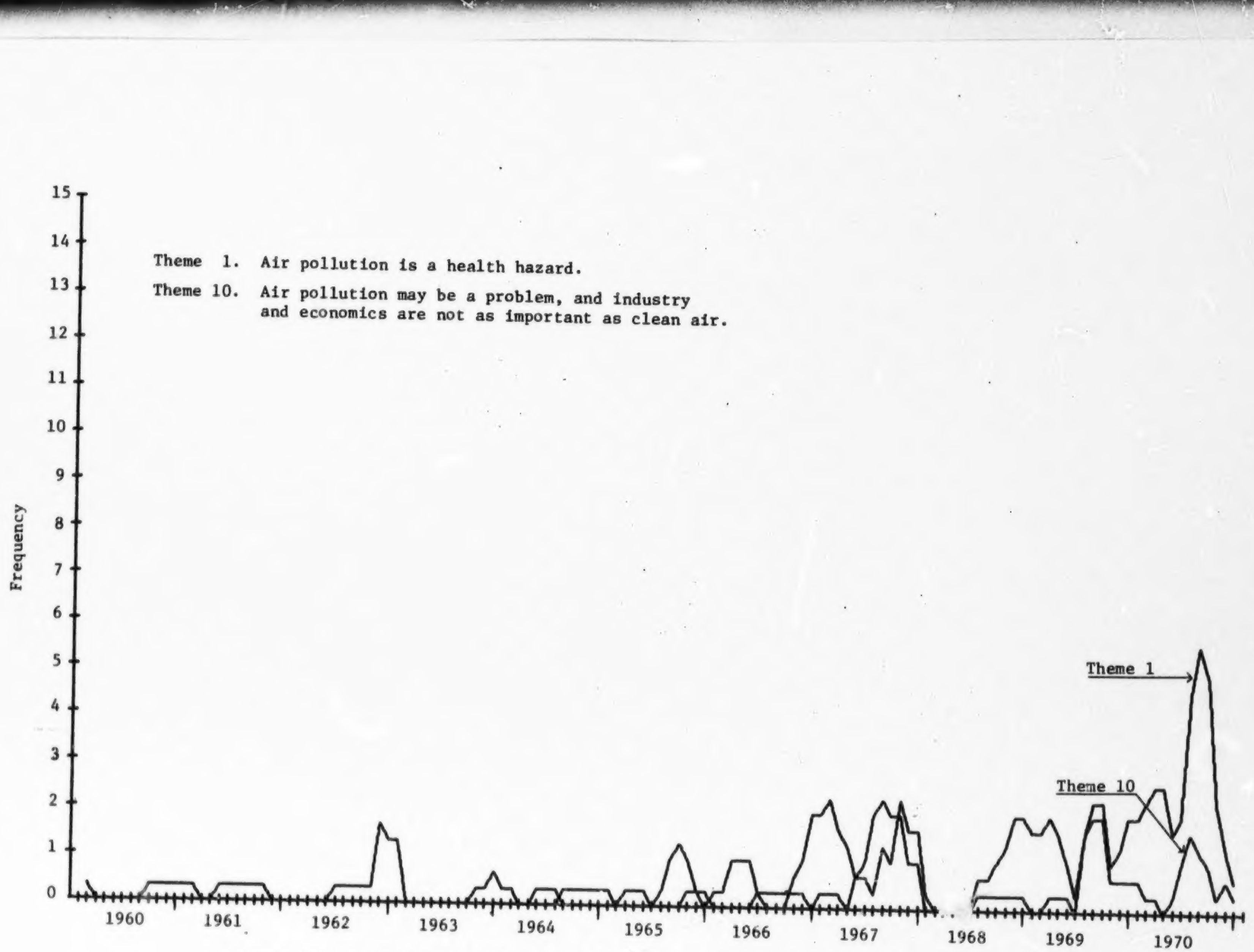


Figure 10. Frequency distribution of "for clean air" themes 1 and 10, Salem, 1960-1970.

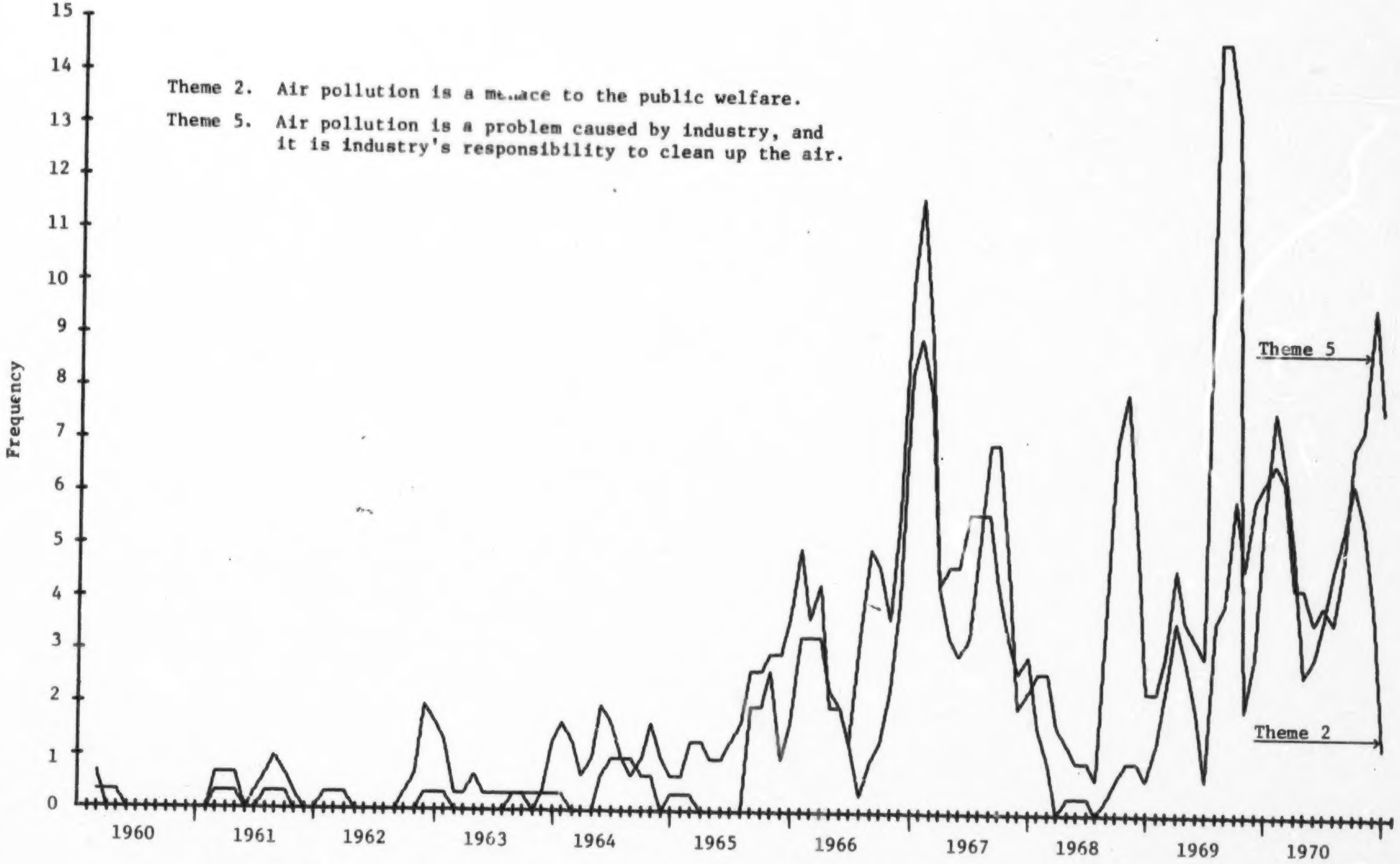


Figure 11. Frequency distribution of "for clean air" themes 2 and 5, Eugene, 1960-1970.

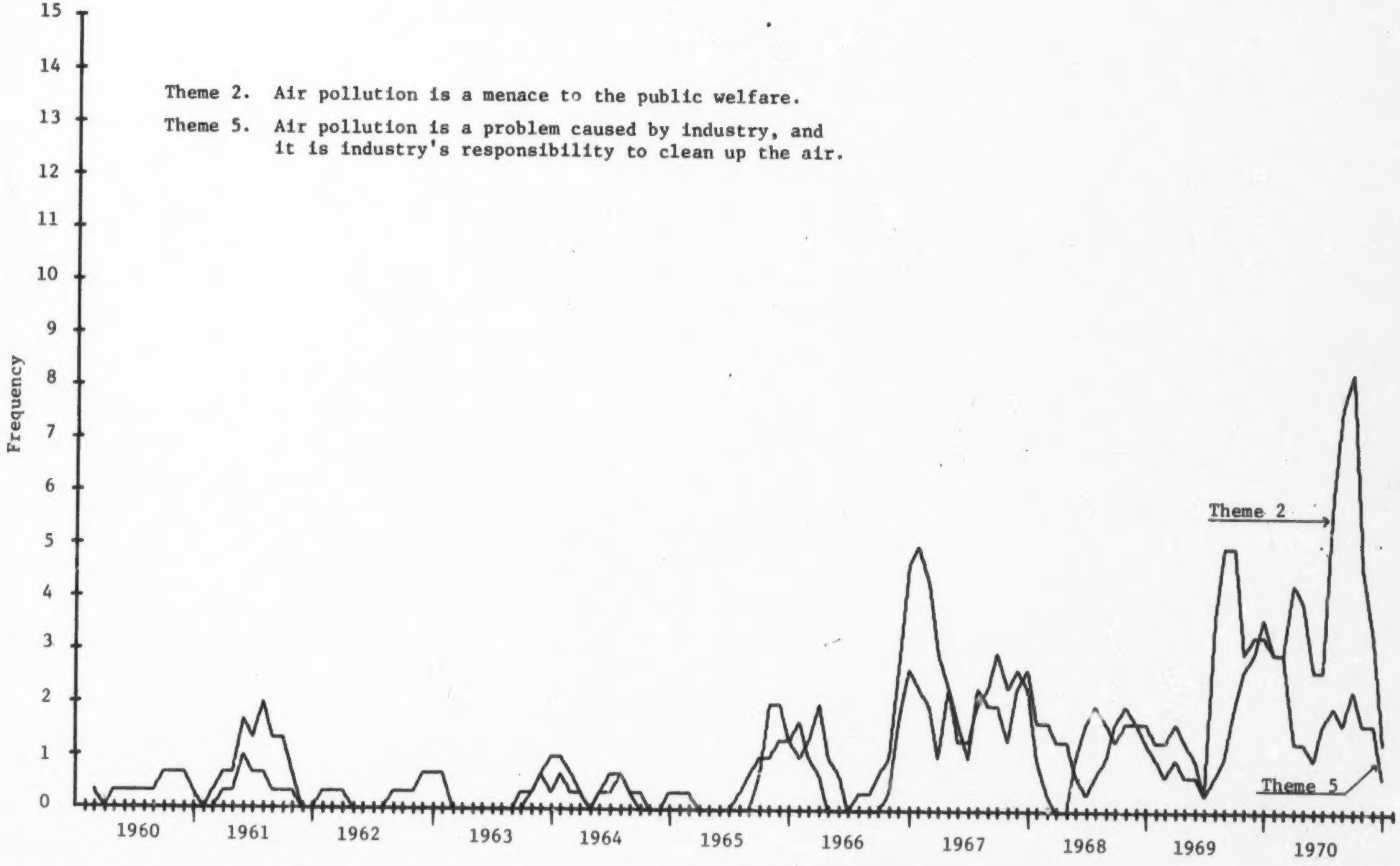


Figure 12. Frequency distribution of "for clean air" themes 2 and 5, Salem, 1960-1970.

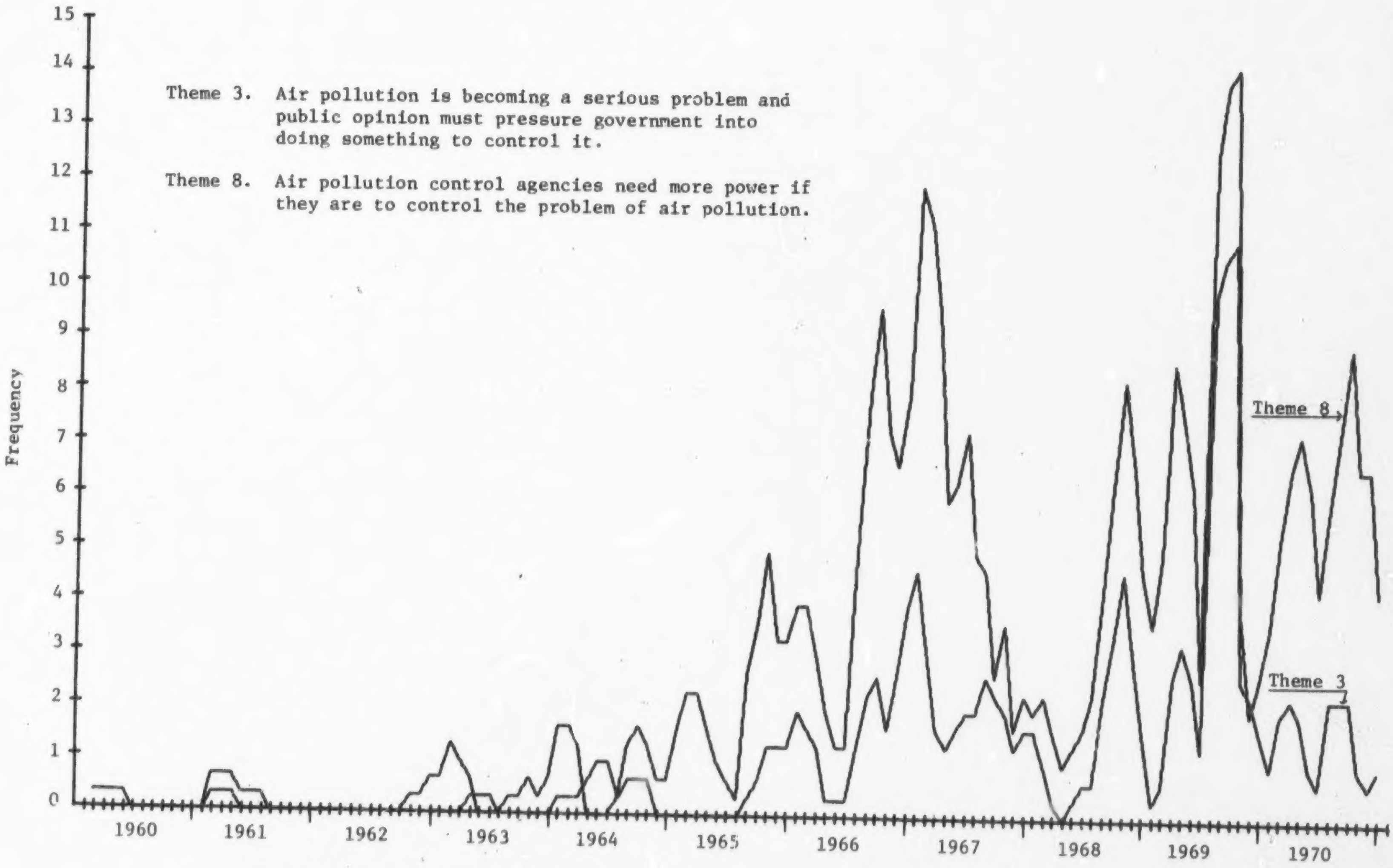


Figure 13. Frequency distribution of "for clean air" themes 3 and 8, Eugene, 1960-1970.

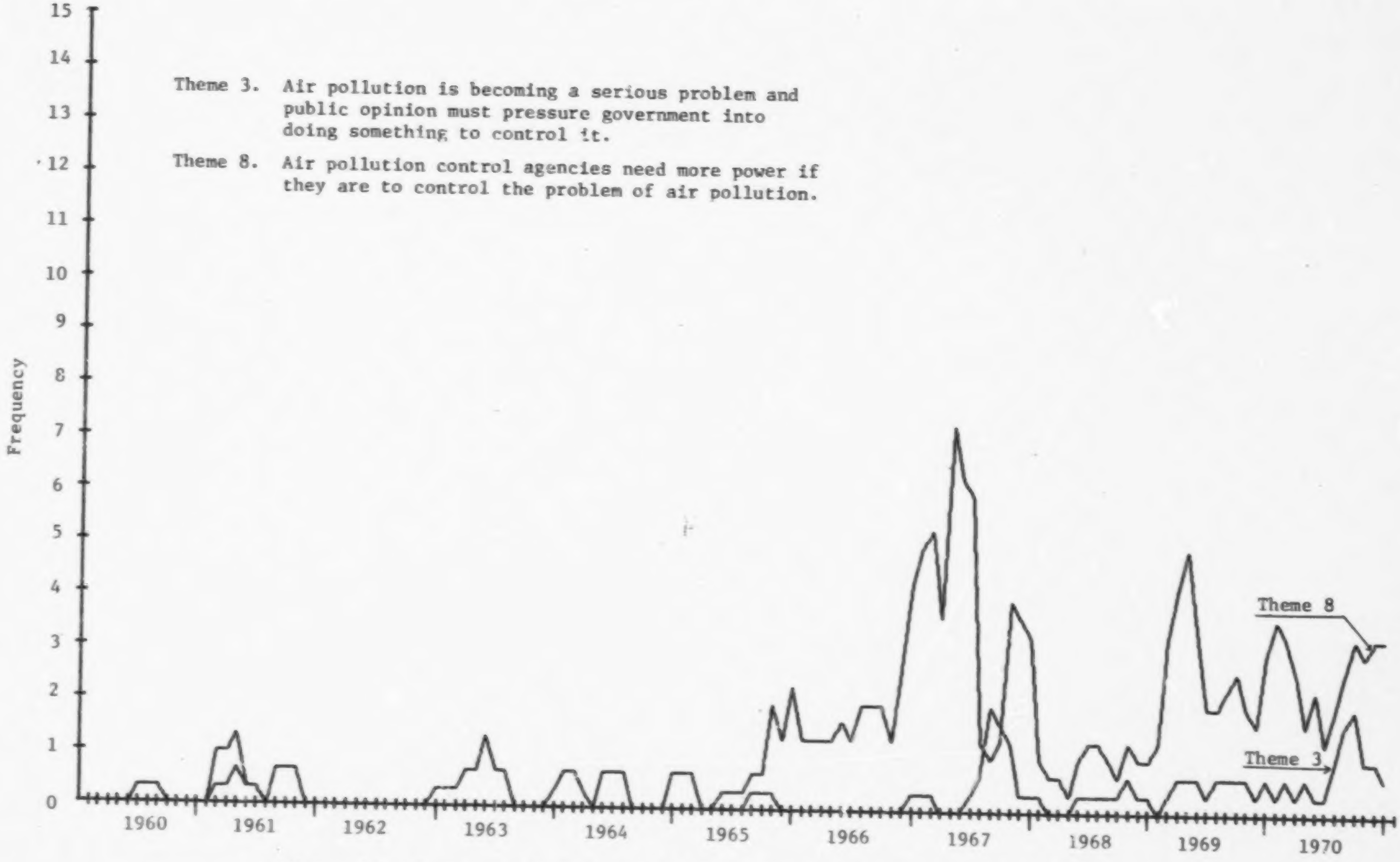


Figure 14. Frequency distribution of "for clean air" themes 3 and 8, Salem, 1960-1970.

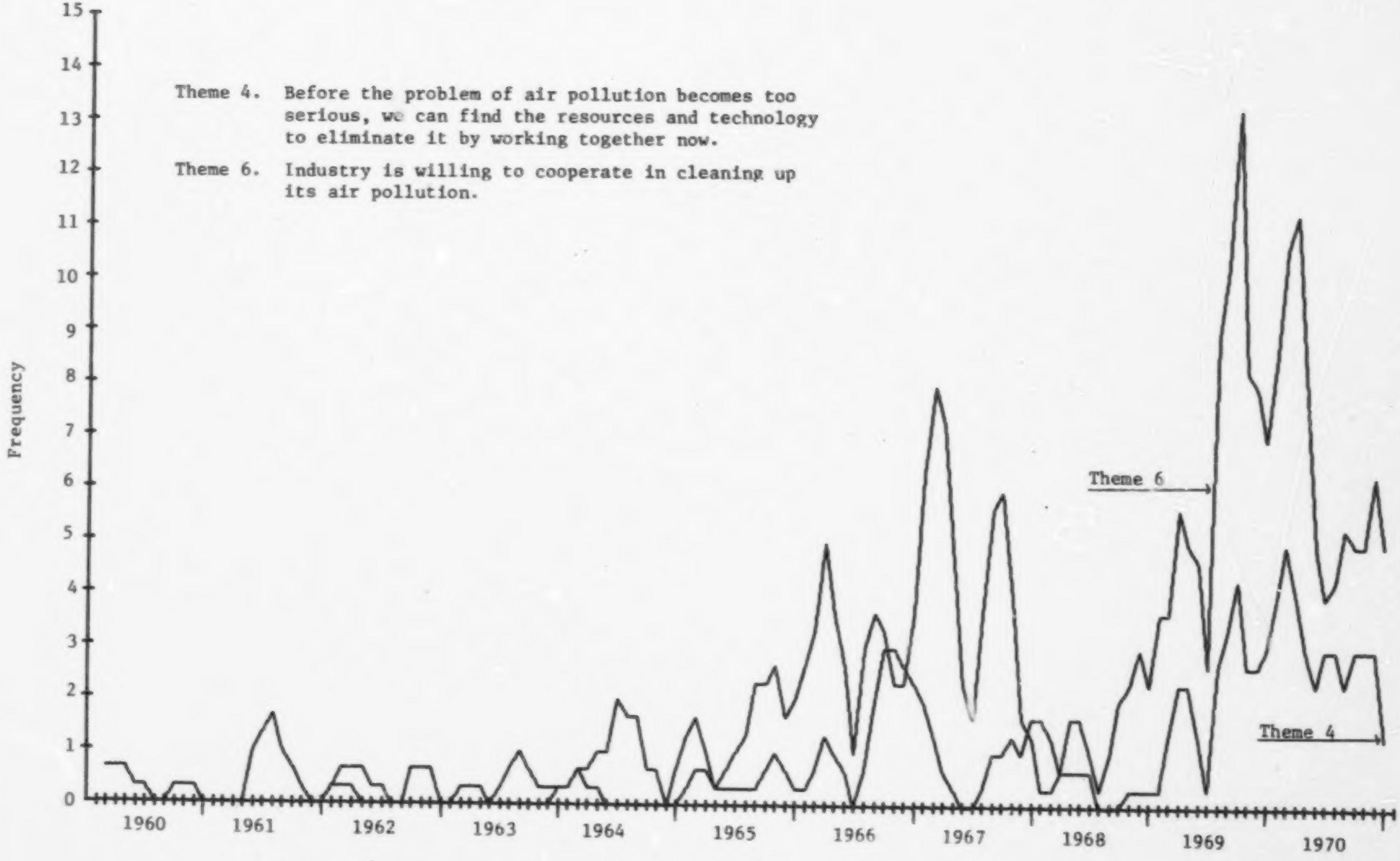
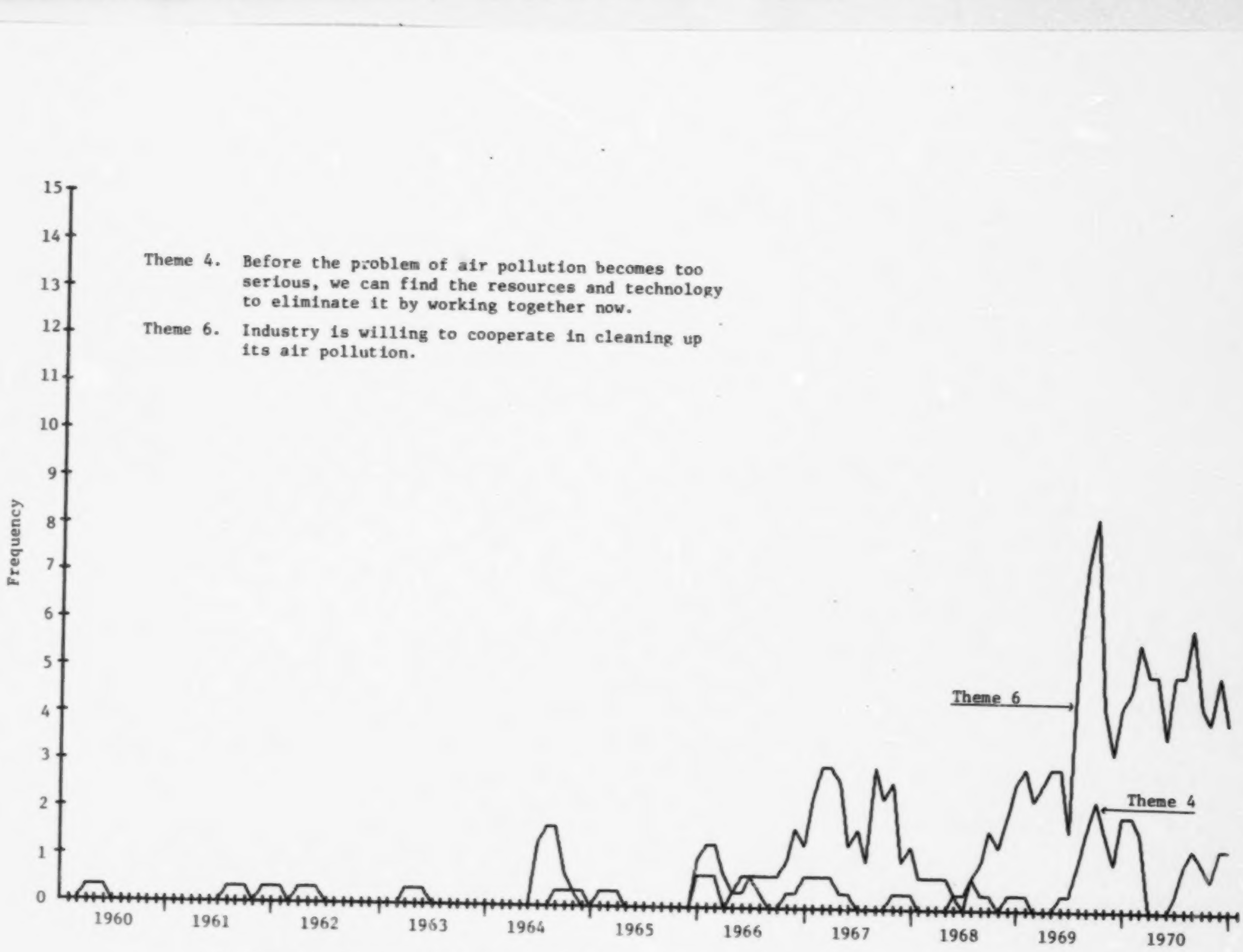


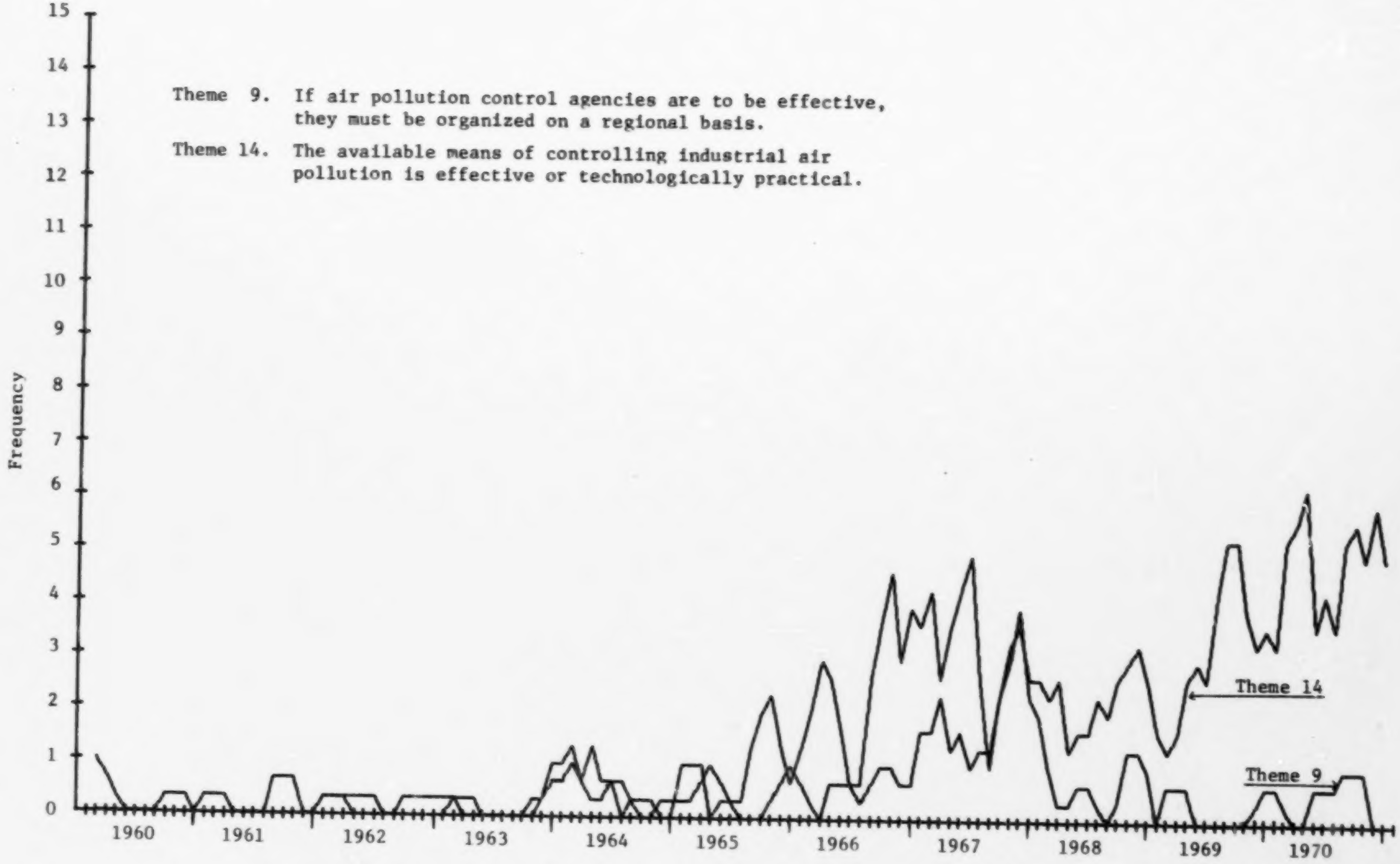
Figure 15. Frequency distribution of "for clean air" themes 4 and 6, Eugene, 1960-1970.



Theme 4. Before the problem of air pollution becomes too serious, we can find the resources and technology to eliminate it by working together now.

Theme 6. Industry is willing to cooperate in cleaning up its air pollution.

Figure 16. Frequency distribution of "for clean air" themes 4 and 6, Salem, 1960-1970.



Theme 9. If air pollution control agencies are to be effective, they must be organized on a regional basis.

Theme 14. The available means of controlling industrial air pollution is effective or technologically practical.

Figure 17. Frequency distribution of "for clean air" themes 9 and 14, Eugene, 1960-1970.

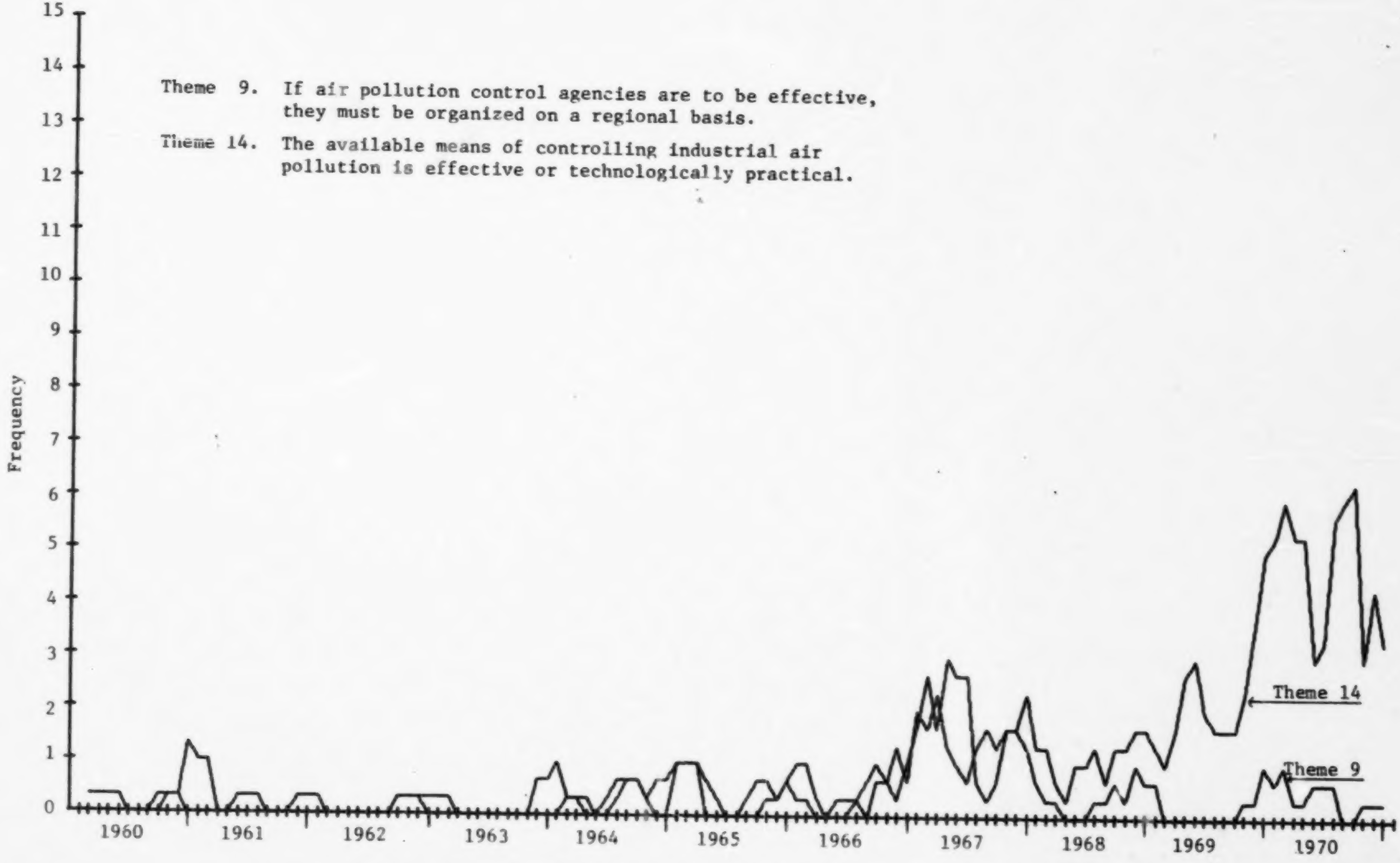


Figure 18. Frequency distribution of "for clean air" themes 9 and 14, Salem, 1960-1970.

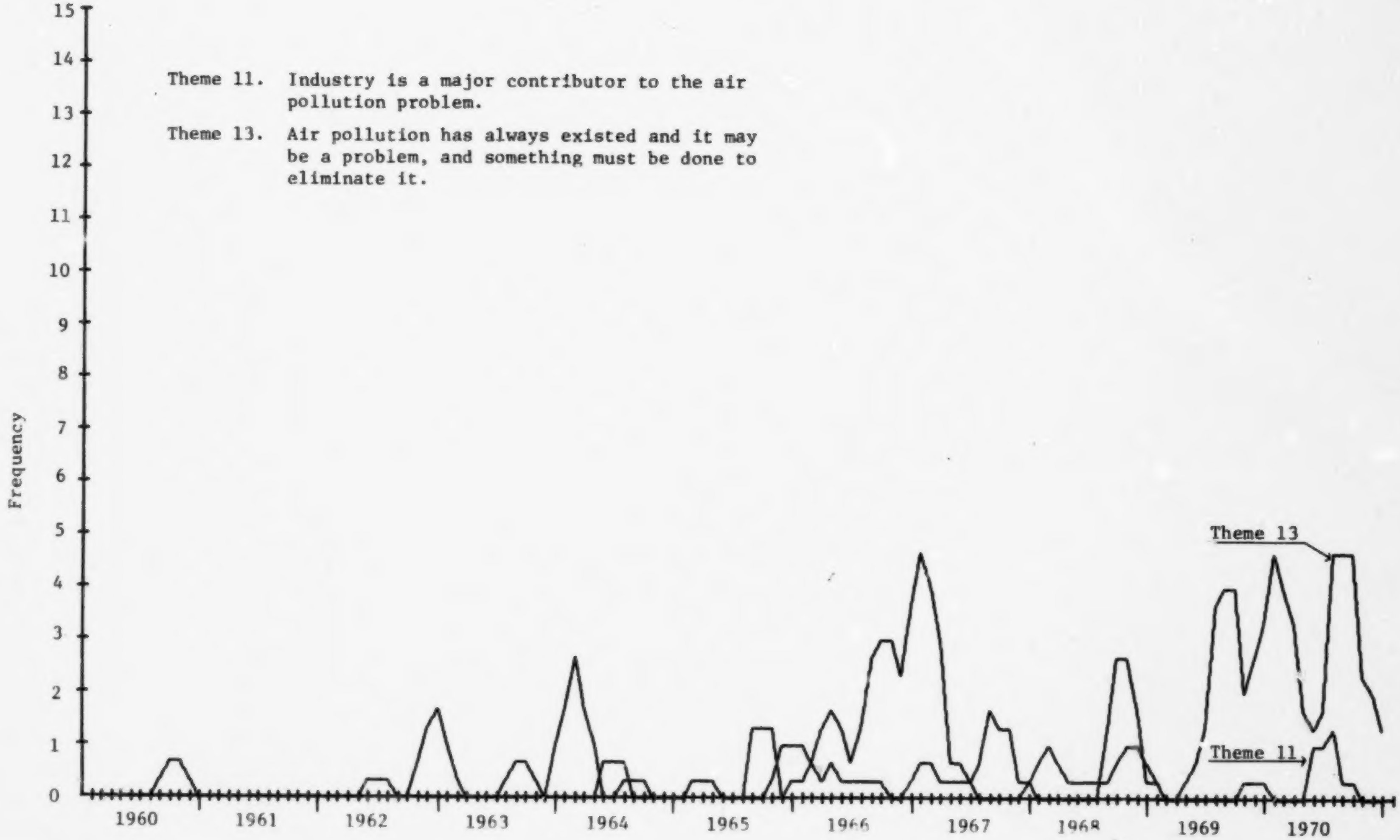
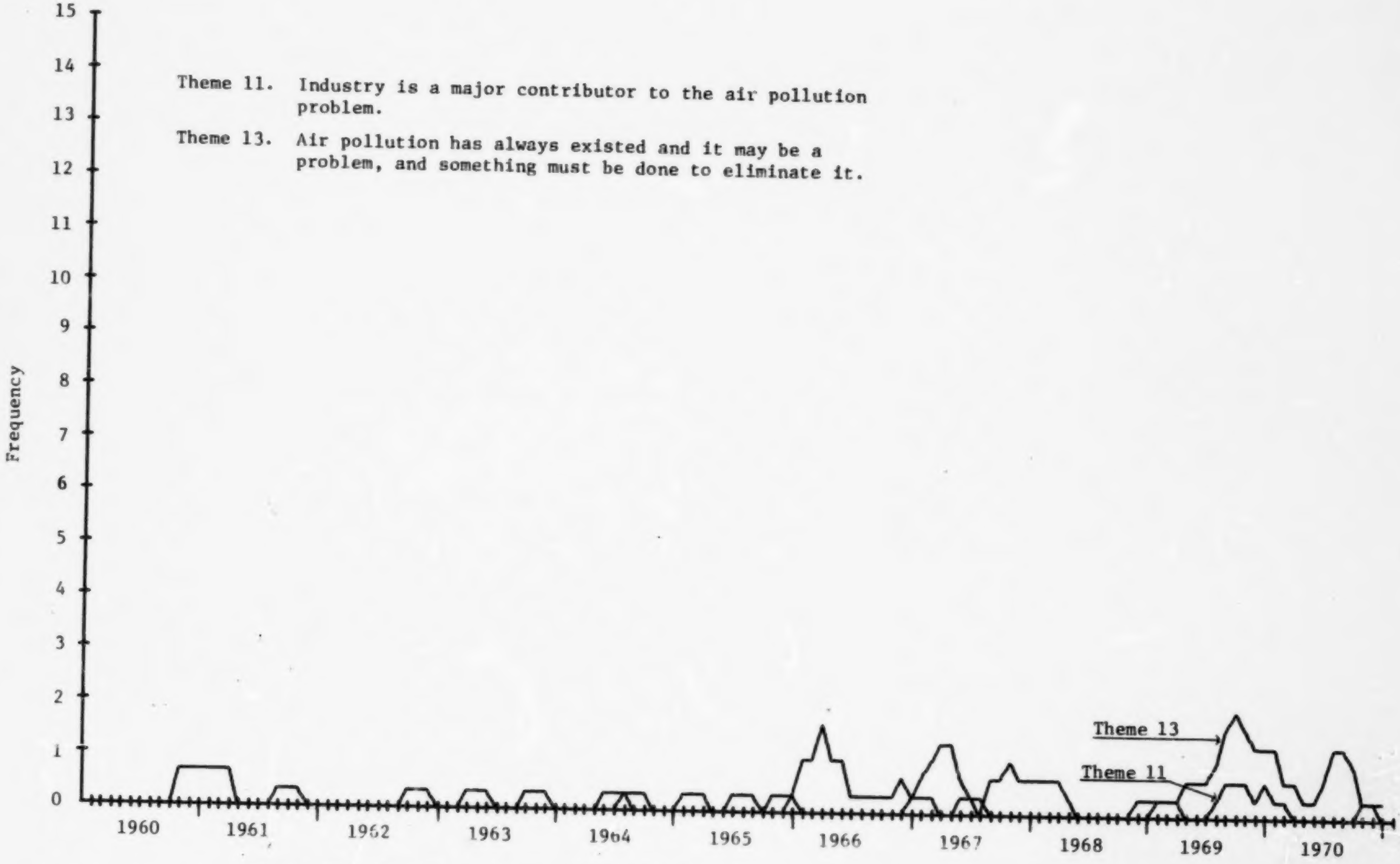


Figure 19. Frequency distribution of "for clean air" themes 11 and 13, Eugene, 1960-1970.



Theme 11. Industry is a major contributor to the air pollution problem.

Theme 13. Air pollution has always existed and it may be a problem, and something must be done to eliminate it.

Figure 20. Frequency distribution of "for clean air" themes 11 and 13, Salem, 1960-1970.

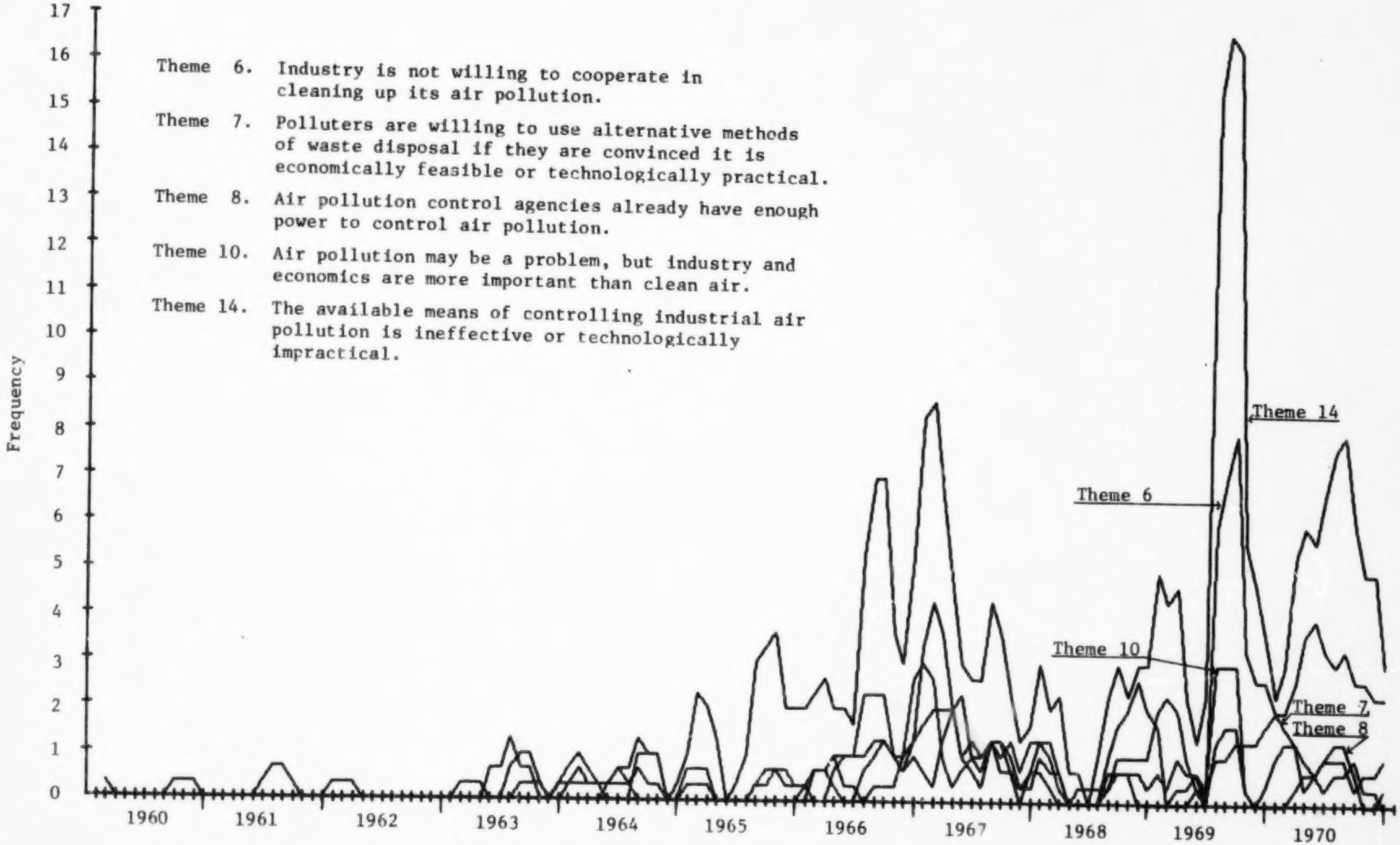


Figure 21. Frequency distribution of "against" clean air themes, Eugene, 1960-1970.

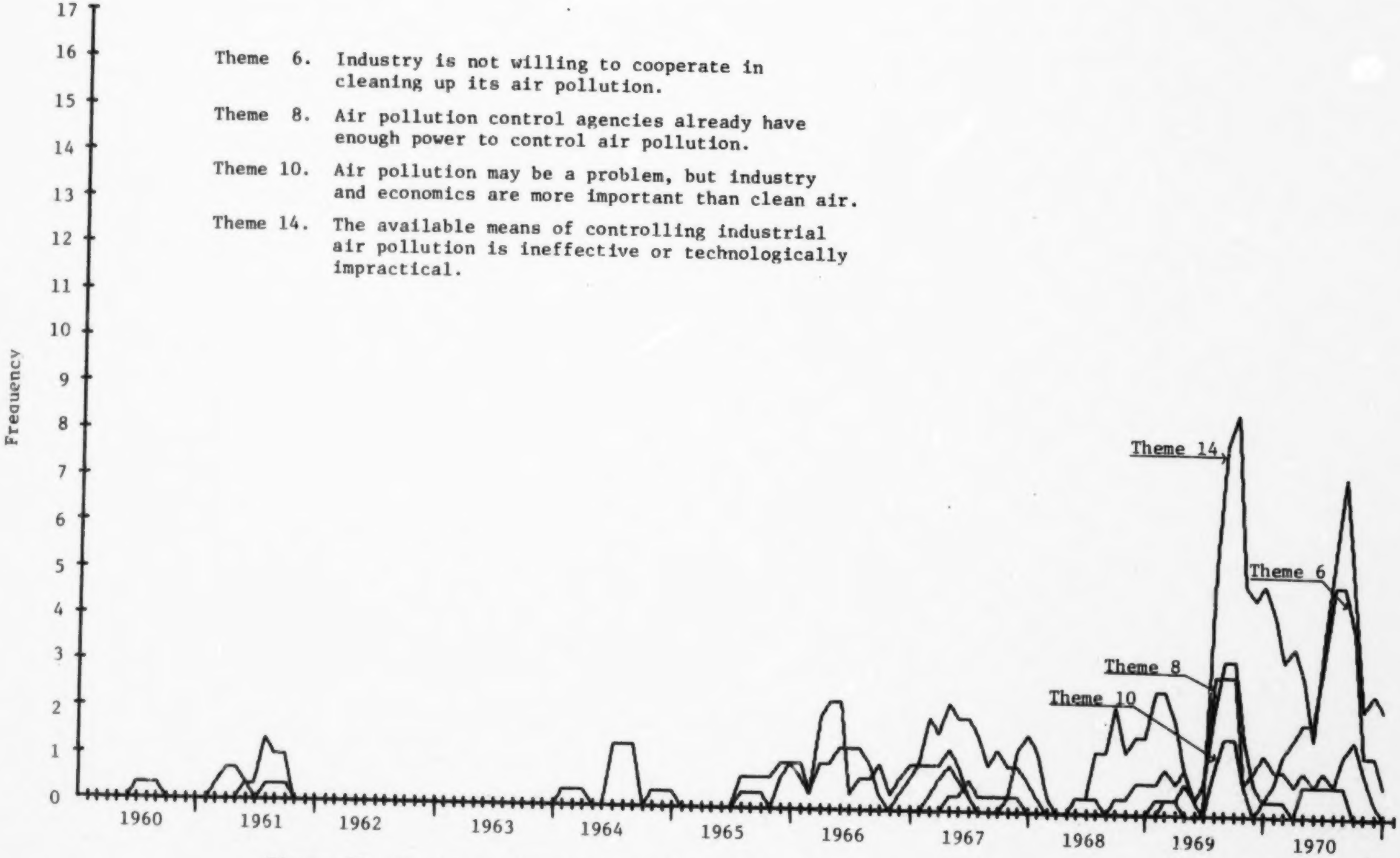


Figure 22. Frequency distribution of "against" clean air themes, Salem, 1960-1970.

APPENDIX D

Verbatim Responses of Individuals Holding Accurate or Inaccurate Visibility Perceptions

How or in what way(s) would you say that the air pollution in Salem (Eugene) is (better) (worse) than when we talked to you last May (September)?
(Accurate responses)

I think field burning is the greatest cause (of air pollution). It's dusty and vegetation is dying and it's the asthmatic ones that suffer terribly. (F, Over 60, Widow of Auto Sales Owner, Salem, Sept.)

The grass burning makes your eyes burn. A couple of times it was so thick it was like fog. One evening about 6 o'clock we were driving down the freeway and everyone had to have their lights on. Sometimes it chokes you up and makes you cough. Trucks and buses really put the smoke out, too. (F, 40-49, Wife of Dispatcher for Can Manufacturer, Salem, Sept.)

I notice that the field burning causes real bad pollution. I don't know how harmful the field burning smoke really is compared to factories. I don't think it is as harmful but it certainly affects the visibility and you can smell it in the air. (F, 20-29, Wife of Correctional Officer, Salem, Sept.)

Smoke--field burning. Whenever the south winds blow you get smoke and gases from the paper mill and it irritates your nose. (M, 50-59, Power Saw Operator, Salem, Sept.)

It(air pollution) is due to field burning. It hasn't affected me personally but it obstructs my view. (M, 30-39, Minister, Salem, Sept.)

The smog and smoke due to field burning seems to be down over town more. Visibility is limited and the smell is terrible. (F, 40-49, Wife of Office Machine Technician, Salem, Sept.)

It's (air pollution) from the field burning. With these new burning laws, we get the smoke from all directions. (M, 50-59, Floor Coverer, Salem, Sept.)

It seems like the smoke is even coming from the East now. I lived in Salem all my life and I remember it as clean without all these odors, etc. I think the taxpayers pay enough. The people causing the pollution should clean it up and I know they can. I don't really know why it's worse but the mill out toward Albany is the worst and the one downtown blackens my house so there is a lot of pollution to do that. Seems like field burning is better but sometimes that blows in too. (F, Over 60, Teacher, Salem, Sept.)

How or in what way(s) would you say that the air pollution in Salem (Eugene) is (better) (worse) than when we talked to you last May (September)?
(Accurate responses continued)

(You are not) able to see as far. Field burning is causing it in our area, also automobiles, I guess. (F, 40-49, Wife of Wholesale Grocery Department Manager, Salem, Sept.)

All I can do is look out of the window and I can't see the things I used to be able to. I know it is worse. What's causing it I don't know unless it's industries and automobiles. (F, 30-39, Wife of Sales Personnel Administrator, Salem, Sept.)

For one thing the odor and the visibility are worse. These are the main things. You can't even see the Coburg Hills anymore, and you've got a raw throat. (F, 40-49, Wife of Construction Equipment Parts Manager, Eugene, Sept.)

Field burning. It's completely overcast on a beautiful day, and it can affect your health. It (air pollution) makes the day miserable when it should be nice. There is really not a hell of a lot you can say about it, other than it is miserable. (M, 20-29, Son of Television Electric Firm Owner, Eugene, Sept.)

There is a little more smoke now that we didn't have in May. The smoke bothers me. It congests my head. Smoke is caused by field burning from up North. I notice it on my clothes. It looks like little stringy black particles. It is especially bad on the days I hang out the laundry. (F, Over 60, Wife of Retired Shoe Salesman, Eugene, Sept.)

There are lots of particles because of field burning down the valley. It is settling where we have our recreation and in our pool and patio. Also the smoke has been far worse (than in May). They've even had to stop burning to look down at the forests to see if there are any forest fires. The field burning is contaminating the forests in the Cascades -- just filthy. (M, 50-59, Self employed, Heating and Air Conditioning, Eugene, Sept.)

There is more soot around (now). Visibility is affected and sometimes the air doesn't smell very good. (F, Over 60, Business College Teacher, Eugene, Sept.)

We get smoke up here on the field burning. I have sinus trouble at that time. (F, 30-39, Wife of Machine Shop Foreman, Eugene, Sept.)

(It is worse from) the field burning. The wind changes and we get the smoke that was supposed to blow somewhere else. (F, 30-39, Wife of Salesman for Publishing Firm, Eugene, Sept.)

How or in what way(s) would you say that the air pollution in Salem (Eugene) is (better) (worse) than when we talked to you last May (September)? (Accurate responses continued)

The haze is over Eugene constantly, plus the visibility (is worse), and the smell and my allergy is acting up and even the shots don't help, so I know it's worse. (F, 40-49, Bookkeeper for Industrial Supply Co., Eugene, Sept.)

It is overcast all of the time. You can't hang clothes out to dry because little particles get all over them. (F, 30-39, Wife of Labeling Machine Crew Operator for Cannery, Eugene, Sept.)

Some of the mills have started up again and there is an awful lot of field burning. During the summer months the extra traffic from vacationers makes it worse. (F, 40-49, Wife of Carpenter-Electrician, Eugene, Sept.)

There is smoke in the afternoons, the sun is hazy and you can't see the hills. The outside of the house is filthy. (F, 40-49, Wife of Freight Service Truck Driver, Eugene, Sept.)

It's been smokier than last month because of the field burning. I don't suppose the winds have been just right for burning. (F, 40-49, Wife of Insurance Agent, Eugene, Sept.)

(It's worse) because of the field burning. One thousand percent better than last year but a lot worse than last May. (F, Over 60, Widow of Construction Engineer, Eugene, Sept.)

You don't have the field burning now. The rain has a tendency to filter the air. (M, 40-49, Insurance Field Representative, Salem, Jan.)

In September they were still doing some field burning. This is a big cause of air pollution. The moisture in the air makes the air clearer. Weather conditions are a big factor in air pollution. (M, Over 60, Machinery Maintenance Worker, Salem, Jan.)

(There is) no burning in the fields now. I think people are getting more conscious of pollution and becoming more careful about trash burning. (F, 50-59, Wife of Body and Fender Shop Owner, Salem, Jan.)

It's raining now, besides the farmers aren't burning and the pollen count is sure down. It's (air pollution) always better in the winter. (F, 40-49, Wife of Civil Engineering Professor, Salem, Jan.)

It seems like when we have rain it (air pollution) always clears up and last September they were burning and that made it bad then, poor farmers. (F, 40-49, Wife of School Custodian, Salem, Jan.)

How or in what way(s) would you say that the air pollution in Salem(Eugene) is (better)(worse) than when we talked to you last May(September)?
(Accurate responses continued)

The rain and winds clean the air a lot and in September we had a lot of the burning and the air was more still. (F, 30-39, Wife of Finance Co. District Manager, Salem, Jan.)

It (the air) is clear now aside from the fog. In the summer the visibility is much worse. The field burning in summer and the sawdust up in the Santiam area cause this. (M, 30-39, Physical Therapist, Salem, Jan.)

(Air pollution) hasn't burned my eyes this winter. When they were burning the fields in September I could really feel it. We also had some really bad days then. (F, 40-49, Wife of Meat Cutter, Salem, Jan.)

The wind and rain have diluted the pollution and increased the good fresh air from the ocean. There are not as many forest fires, dust storms, etc. in the winter, and not as much open burning either. (M, 40-49, Retail Clothing Salesman, Salem, Jan.)

There are not as many particles in the air now. The air has been washed and there is no field burning. (M, 50-59, Owner Retail Music Store, Salem, Jan.)

(The air pollution is better) because the farmers quit burning. Now I can see the mountains. There is more wind now and the rain has cleaned the air. (M. 40-49, President of Underground Utility, Salem, Jan.)

There isn't as much smoke in the air now. There is less field burning and I can see farther now than last summer. There is no doubt that there are fewer cars now. The recent rains have no doubt cleaned the air some. Some mills have closed down here and there, and the gravel roads are not so dusty. (M, 50-59, Laundry Washerman, Salem, Jan.)

I think it is simply the time of year. There is no field burning now and no slash burning. The wind in winter brings in pollution from the Albany mill when it is from the South and the mill here in town when the wind is from the North, however. (F, 40-49, Wife of Service Station Owner, Salem, Jan.)

I can see the mountains better from our house now. The atmosphere seems better -- less smog around. (M, 20-29, Highway Department Traffic Analyst, Salem, Jan.)

I have not noticed any smells. There hasn't been any field burning now so there is no smoke. There is not as much dust and I don't have to dust the furniture as often. (F, 20-29, Wife of Bank Loan Officer, Eugene, Jan.)

How or in what way(s) would you say that the air pollution in Salem(Eugene) is (better)(worse) than when we talked to you last May(September)? (Accurate responses continued)

The air is cleaner now, there is better visibility and the air is easier to breathe. The mill North of us got rid of their wigwam burner. Field burning controls have improved the problem. (M, Over 60, Shipping and Receiving Clerk, Eugene, Jan.)

They are not burning the fields, no forest fires, and there are not as many cars and trucks on the road this time of year. (F, 40-49, Wife of Appliance Parts Salesman, Eugene, Jan.)

Some of the industries are working on controlling their pollution now. Field burning has stopped. The city of Eugene is passing an excessive exhaust law and this will help. People are more informed but the only time they get upset is during field burning. People seem to have accepted Weyerhaeuser and its smell as part of the Eugene atmosphere. The non-leaded gas, if everyone uses it, will help. The major companies are making great efforts. The use of wigwam burners has been done away with and this will help the particulate pollution (problem). (F, 50-59, Wife of Railroad Supervisor, Eugene, Jan.)

You don't have the black soot in the air now. The rains have definitely cleared the air. It's as close to normal as can be. . I'm very upset by how pollution bothers people with allergies and the threat (air pollution) is to our wildlife. I really feel it's (air pollution) a lot better. It's not perfect, but a lot better than in September. (F, 30-39, Wife of Dentist, Eugene, Jan.)

They are not burning the fields now and the rain tends to clear the air. The clouds may tend to hide the pollutants so they appear to be better. The prevailing winds and rains clear the air. I'm sure we have more cars than six months ago but the weather seems to give us cleaner air now. I don't want them (undefined) to think they have done a lot to clean our air. They haven't, the weather has cleaned it. (M, 30-39, Plumber-Steamfitter, Eugene, Jan.)

It's clearer--the air is clearer. You can see farther. (F, 40-49, Wife of City Maintenance Worker, Eugene, Jan.)

It's quite a bit better because of the atmosphere as well as the controls. The farmers aren't burning at all and there isn't any other burning. The big waste burners are no longer used and I know Weyerhaeuser is trying to reduce its pollution. (F, 50-59 District Court Register Clerk, Eugene, Jan.)

How or in what way(s) would you say that the air pollution in Salem (Eugene) is (better) (worse) than when we talked to you last May (September)? (Accurate responses continued)

I haven't noticed it (air pollution) burning my eyes like it did in September. It might be just the different time of year. I don't notice it as bad as when I first moved out here 12 years ago. (M, 50-59, Electronics, Eugene, Jan.)

Through visibility is the only way I have of judging it (air pollution). That August and September period was bad every day. Now it might be bad only every three days. It's nowhere near as evident. (M, 30-39, Wholesale Drug Salesman, Eugene, Jan.)

It's (the air) clearer, not quite all the smoke and soot on the windows, doorways and cars, etc., now. They aren't field burning. (F, Over 60, Wife of Physical Plant Maintenance Worker, Eugene, Jan.)

It (air pollution) has just cleared up. At that time (September) it was smoky. I think this rain and cold weather has a lot to do with clearing the air. The air is clearer and if you are out at night most of the stars are visible. In September, only a few were visible once in a while. I just think the air will eventually clean itself if we stop putting more stuff in it. It's up to industry to take their money to research to eliminate the waste products as much as possible. I notice the farmers are hollering for the government to solve their pollution problem, but the industries are already spending millions to work on theirs. I believe that the farming industry is big enought to support research of their own. Let the farmers shell out some of their profits. (M, 50-59, Filter Plant Operator, Eugene, Jan.)

How or in what way(s) would you say that the air pollution in Salem (Eugene) is (better) (worse) than when we talked to you last May (September)?
(Inaccurate responses)

It isn't as smoky as it was then. I think maybe the heat and dryness cured the fields somewhat. We had it bad for a few days when they were burning but I think the cool evenings will help more. (F, 50-59, Drug Store Salesclerk, Salem, Sept.)

They just don't happen to be burning a field now as they were when you talked to me before. It hasn't bothered me in the last couple of weeks. (F, 20-29, Wife of Lumber Products Production Manager, Salem, Sept.)

Field burning is not nearly as smoky or on as many days as last year. I do not smell the paper mills anymore. (M, 30-39, Psychiatric Aide, Salem, Sept.)

Seems like the atmosphere is cleaner. It is not as smoggy or smoky. I have no idea why this would be unless they are working to control it. We haven't been able to burn all summer. (F, Over 60, Widow of Railroad Yard Electrician, Salem, Sept.)

We have had more wind the last few days. It just isn't as smoky as it was. A lot of smoke in the air would be better if they would allow them to burn on a hot day instead they wait till a cloudy day and it all stays close to the ground. (M, 40-49, State Fire Department Statistician, Salem, Sept.)

The atmosphere conditions in summer help carry it off so conditions are better, but the situation itself is no better. (M, 20-29, Piano Sales Credit Manager, Salem, Sept.)

They had controlled field burning this year. I think it helped a lot. No days when the sun was obliterated. I know what we are doing at the plant. (F, 40-49, Wife of Accountant, Salem, Sept.)

Visibility--I listened to the pollution indexes from Portland, but I don't know about here. I just grew up with it so I didn't realize it was pollution. (F, 30-39, Secretary, Salem, Sept.)

The field burning has eased off. We have had a little rain. I lived here all my life and it has always been smoky and it isn't the farmers. They are getting blamed for big business who pollute the air 365 days a year and the seed men burn their fields off in an hour. (M, Over 60, Newspaper Circulation, Salem, Sept.)

The field burning isn't as bad as usual so it's been better since May. (M, 40-49, Construction Contractor, Eugene, Sept.)

How or in what way(s) would you say that the air pollution in Salem (Eugene) is (better) (worse) than when we talked to you last May (September)?
(Inaccurate responses continued)

There's less smoke in the air. The reason it's been a good year for burning -- wet grass makes more smoke and they are trying to control it. (M, Over 60, Retired Farmer, Eugene, Sept.)

We have not had as much smell from Weyerhaeuser and Georgia-Pacific isn't smoking as bad as they used to. They have done a good job with field burning with a few exceptions when the wind turned. (M, 30-39, Mechanical Engineer, Eugene, Sept.)

There aren't as many burned particles in the air. There is not as much smoke. (The air) doesn't smell of smoke either. (F, 20-29, Wife of Retail Sales Department Manager, Eugene, Sept.)

One's health is better. Individuals in the community have cared and done more. Officers of the law call attention to the burning of trash. Police have controlled dogs more in neighbors' yards. Mills have done a lot to control and do away with stacks. Motor exhausts have been neglected. Eugene has done just fine. I think something should be done about the pollution in the rivers and the mill workers who are breathing in the dust. (F, Over 60, Art Teacher, Eugene, Sept.)

Before we had lots of smoky days and couldn't see anything. Not so much smoke now. Industry has tried better to do their best. Citizens are not allowed to do outside burning and that helps. People are burned up about that. (M, Over 60, Retired Meat Cutter, Eugene, Sept.)

It's smoky for short periods of time, (but) it clears up early in the evening. They have done a better job this year. (F, 20-29, Wife of Tree Planter, Eugene, Sept.)

They have tried to control the burning so that it didn't go down the city. I know they had burning regulations. The state had it controlled. They did it when the wind was just right. (F, Over 60, Wife of Physical Education Equipment Supervisor, Eugene, Sept.)

There's been only two nights that we've come home and not been able to see Spencer's Butte. Pollution in general is better. Not the field burning, however. Those farmers make it cool, smoky and miserable for us. I don't think we need to kill the agricultural owners living. (F, 50-59, Wife of Architect, Eugene, Sept.)

There is industrial pollution over the East of us from the paper mills. It is better because they are not burning fields but I imagine they'll burn again soon as it stops raining. The Chairman of the Department of Environmental Quality is a field burning farmer and I think that is absurd. (M, 20-29, Attorney, Eugene, Sept.)

How or in what way(s) would you say that the air pollution in Salem (Eugene) is (better) (worse) than when we talked to you last May (September)?
(Inaccurate responses continued)

It's better because of the ban on field burning, but as far as every day pollution goes, it is about the same. I don't recall getting odor from Weyerhaeuser like I used to. (F, 30-39, Wife of Fire Department Dispatcher, Eugene, Sept.)

We haven't had quite as much smoke. Mondays have been bad for about three weeks. Our pollution is only field burning. (F, 30-39, Wife of Electrician, Eugene, Sept.)

It is not quite so dense. I can see the sun once in awhile, at least. (F, 40-49, Housekeeper, Eugene, Sept.)

I don't see smoke in the air or valley now. I can't hardly tell till winter comes. Winter is when you can tell it on the windows. It is greasy and collects like fog, only it's blue stuff. (M, 40-49, Plywood Putty Patcher, Eugene, Sept.)

They are burning only when the wind is blowing northeast. I think there is less smoke. They have taken down several wigwams lately and the foundry has been moved from our neighborhood since spring. (F, 40-49, Wife of Mail Carrier, Eugene, Sept.)

It is better because the one sawdust mill is gone and there aren't as many smoke burners now. When the wind is right it is a help because of the fields (burning). One day, though, about everybody choked when the wind turned. (F, Over 60, Wife of Foundry Worker, Eugene, Sept.)

In the winter it (weather) holds it (air pollution) down closer to the earth. It gives me sinus drainage and plugs my nose up. Cars and industry seem to be the things that cause it. I mean the paper mill especially. (F, 20-29, Wife of Auto Mechanic, Salem, Jan.)

We get an awful lot of odor out here this winter. Paper or pulp mill smoke (causes this). The summer field burning is bad. I suppose cars and trucks also contribute. (F, 30-39, Wife of New Car Salesman, Salem, Jan.)

It seems that in comparison with previous winters, there is a lot more smog. Very poor visibility. There is just a greater accumulation of air pollutants. It must be industry because it could not be field burning now. (F, 40-49, Wife of Community College Instructor, Salem, Jan.)

When the weather is calm, smog drifts down and settles and gets real bad. Boise Cascade and the pulp mill at Albany (cause pollution). This combined with carbon monoxide from cars and you really have something. (M, Over 60, Baker, Salem, Jan.)

How or in what way(s) would you say that the air pollution in Salem (Eugene) is (better) (worse) than when we talked to you last May (September)? (Inaccurate responses continued)

Weather conditions is the greatest reason for it. People are aware of the problem but still haven't stopped burning and don't abide by the request. It would mainly (be caused by) the burning and (people) will burn at any time regardless of the request not to. (F, 30-39, Wife of Mailman, Salem, Jan.)

The smell as far as the mills go has gotten worse here. The smog makes visability a little worse. There seems to be more and more of a build up of air pollutants in the air all the time. (F, 20-29, Wife of Design Draftsman, Salem, Jan.)

It (air pollution) has been noticed. Perhaps it is because I've been more aware of it since talking to the first lady (interviewer). Before I'd have thought it was fog. (F, 50-59, Fertilizer Sales Warehouse Foreman, Salem, Jan.)

Nothing basically has been done (about air pollution). New industries (are here) and the added population is causing more pollution from autos. Certain climatic conditions (make it worse). (M, 40-49, School Principal, Salem, Jan.)

It (air pollution) hurts your nose and makes your eyes run. A month or two ago this may have been from more traffic. The new Fred Meyer store creates more traffic, which means more car (pollution). Some of the cars really throw off oil fumes. Lots of trucks taking orders to and from the store, (F, Over 60, Wife of State Forestry Radio Engineer, Salem, Jan.)

There are still no controls and the production of pollution is growing. There are more autos, more population and more industry and other sources of pollution. The controls have not been put on population and industry. (M, 50-59, VP of Engineering and Marketing Firm, Eugene, Jan.)

The air is so dense now. We didn't have a week of sun last year. It's true that it was bad last September. I guess it was worse then. It's just that the smoke is close to the ground now. When you're in Cottage Grove it's always sunny and you look over here and there is always a cloud of smoke hanging over. (F, 50-59, Wife of Locomotive Engineer, Eugene, Jan.)

Increased industrial, increased residential and increased automotive pollution (makes it worse now). (M, 20-29, Business Equipment Sales Representative, Eugene, Jan.)

The last couple of weeks have been pretty ripe around here. The sewer plant is on one side and Weyerhaeuser is on the other. (M, 50-59, Cemetery Maintenance Worker, Eugene, Jan.)

How or in what way(s) would you say that the air pollution in Salem (Eugene) is (better) (worse) than when we talked to you last May (September).?
(Inaccurate responses continued)

When you live away from industrial parts, you don't notice it as much, but it came out in the paper that snow recently was caused by air pollution particles hitting the cold air which caused snow. They called it snow pollution. (F, 50-59, Wife of Bakery Salesman, Eugene, Jan.)

Last week we had air pollution frozen in the air. Seems like with our fog in our valley it (fog) holds it (pollution) in for a week at a time. The worst thing is the irritation to your eyes. A woman had written in the paper saying they cleaned up wigwam burners, but have to clear sawdust away in diesel trucks which are polluting the air. In Garfield, creosol dumped out of a pipe into the gutter and killed plants, and that eventually gets into water. (F, 40-49, Wife of Athletic Department Worker, Eugene, Jan.)